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CLEANUP PLAN

NEWARK TERMINAL
NEWARK, NEW JERSEY

ECRA CASE #84455

PREPARED FOR:

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1.0 INTRODUCTION

This Cleanup Plan is submitted by Texaco Refining and Marketing Inc. (Texaco) pursuant to the New Jersey Environmental Cleanup Responsibility Act (ECRA) regulations issued by the New Jersey Department of Environmental Protection (NJDEP). This Cleanup Plan addresses the remediation of Texaco's Terminal.

This document consists of ten sections. Sections 1.0 through 4.0 present general background information on the Newark Terminal site. Section 1.0 presents the site location and history of the site. Section 2.0 describes the environmental setting consisting of the site's geologic and hydrogeologic condition as well as topographic and surface drainage characteristics. Section 3.0 describes the Newark Terminal process operation, storage facilities and known site spillages. Section 4.0 presents the areas of environmental concern which will be addressed in Section 8.0. These areas include the tank basins, unpaved soil areas (Area A), paved soil areas and the concrete vault.

Sections 5.0 and 6.0 describe previous sampling activities and remedial programs performed. Section 5.0 discusses the three phases of remedial investigations performed along with analytical results. Section 6.0 describes the previous remedial activities which include the underground storage tank removal program and the insitu biodegradation of tank basin soils.

Sections 8.0 through 10.0 present cleanup levels, the proposed cleanup activities, and a cost estimate and schedule for these activities. Section 8.0 discusses preremedial activities to be performed prior to environmental cleanup and the actual cleanup activities proposed for the areas of environmental concern. Section 9.0 contains the cost estimate associated with the cleanup activities and Section 10.0 contains the remedial cleanup schedule.

1.1 SITE LOCATION AND BACKGROUND

The Newark Terminal is a petroleum storage facility presently owned and operated by Power-Test Inc. under the name Getty Petroleum Corporation

(Getty). The Newark Terminal is located on 86 Doremus Avenue in Newark, New Jersey. The site lies adjacent to the bank of the Passaic River (see Figure 1). The site is located within the industrial area bounded by the New Jersey Turnpike on the northeast border, Raymond Boulevard on the northwest border, Newark and New York Central Railroad on the southwest border and the Passaic River on the southeast border (see Figure 2). The adjacent property owners consist of various chemical and petroleum industries. The site is approximately 14.5 acres and surface water drains easterly towards the Passaic River.

The Newark Terminal was constructed in 1930 and operated as a petroleum storage facility by the Atlantic Richfield Company (ARCO) until 1950 at which time it was acquired by Getty. Getty also operated the terminal as a petroleum storage facility from 1950 to 1984 until its merger with Texaco.

Upon purchase of Getty in 1984, Texaco was instructed by the United States Government to release some of its holdings. Texaco was required to sell the Newark Terminal, and accordingly filed an Administrative Consent Order (ACO) with the NJDEP. Texaco posted a bond to permit conveyance of the property prior to obtaining ECRA clearance. In 1985, Power-Test, Inc. purchased the site and currently owns and operates the Terminal.

1.2 SITE HISTORY

The Cleanup Plan is based on the results of three previous investigations conducted at the site. The Phase I Investigation was conducted from August 1984 to March 1985, and consisted of four separate sampling events. The Phase II Investigation was performed in January and February 1986, and the Phase III Investigation was conducted from May to June 1988.

The Phase I Investigation consisted of the installation of 11 monitor wells, the completion of several soil borings, and the collection of various hand auger and ground water samples to define existing soil and ground water quality. The first sampling event results indicated areas of environmental concern for total petroleum hydrocarbons (TPHC) and lead. These locations

include the diked areas, stormwater discharge points, the West Yard (background sample) and an area where a pipeline leak once occured.

A review of the data from the first sampling event indicated the need for further sampling in order to characterize soil and ground water inside the diked areas. In response, a second round of soil and ground water sampling was conducted on September 25, 1984. Evaluation of the analytical results from the first two sampling events prompted a ground water quality assessment. The assessment included the installation of 11 monitoring wells (MW-01 to MW-11) and soil sampling at 16 additional locations.

The fourth event in the Phase I Investigation was conducted from February 22 through March 27, 1985, and included integrity testing of active underground tanks (Tanks F, H, J, K, L and M) and the performance of soil borings around tanks (Tanks E, G, H, I and N) which were inactive or could not be tested by the Petro-Tite method. This work was initiated in response to a request by the NJDEP for results of underground tank testing.

The four sampling episodes described above comprise Phase I of the Newark Terminal investigation. The Phase I Investigation indicated petroleum hydrocarbons within certain tank basin areas. The results of the Phase I study were submitted in 1985 in the Site Evaluation Submission (SES) and addendum reports. Phase II Investigation was conducted upon evaluation of analytical results generated during the Phase I Investigation.

The Phase II investigation involved the installation and sampling of 2 additional monitor wells (MW-12 and MW-13) and the removal of certain underground storage tanks. The results of this investigation are contained in the report entitled "Additional Site Investigations and Cleanup Activities" dated August 1986.

During 1986 and 1987, Texaco initiated an in-situ biodegradation program designed to reduce the TPHC content in the tank basin areas and drum storage drainage area. This program consisted of rototilling the soil and the addition of lime and nutrients to stimulate the natural bacteria to biodegrade

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the petroleum hydrocarbons present. The biodegradation field program was conducted from May 1986 through January 1987.

The Phase III Investigation conducted at the Newark Terminal included the collection of hand auger and soil boring samples and the installation of 2 additional monitor wells (MW-14 and MW-15). The findings of the Phase III Investigation have previously been submitted to the Department in the "Revised Sampling and Analysis Plan (RSAP) Report for Texaco Refining and Marketing Inc., at the Former Getty Marketing and Refining Company Site," July 1988.

The sampling programs and analytical results from the above mentioned site investigations are summarized and discussed in Section 5.0 of this cleanup plan. The sampling investigations which have been performed at the site to date have been briefly described in the section above. Additional activities and milestones which have occurred concerning the history of the site since it has been involved in the ECRA process are presented in Table 1.

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2.0 ENVIRONMENTAL SETTING

2.1 GEOLOGIC SETTING

The Newark Terminal is located in the Piedmont physiographic province (Geologic Map of New Jersey, 1984). The Piedmont Province is composed of rocks collectively known as the Triassic-Newark Group which are of Late Triassic and Early Triassic age (230 to 190 million years). The rocks consist of interbedded sandstone, siltstone, shale and conglomerate and are typically reddish-brown in color. They lie in a northeast-southwest trending belt which is regionally tilted northwestward. More resistant diabase and basalt in the form of lava flows and intrusive sills and dikes also exist within the province. These rock types are more resistant than sandstone or shale and form ridges and uplands. The rocks within the Piedmont rest on a large crustal block that dropped downward in the early stages of the opening of the Atlantic Ocean. These blocks formed valleys known as rift basins. Sediment eroded from adjacent uplands was deposited along rivers and in lakes within the basins, and subsequently became compacted and cemented to form the bedrock.

2.1.1 Local Geology

The bedrock underlying the site and the surrounding area consists of shale belonging to the Brunswick Formation. The Brunswick is characterized by soft red shale containing beds of sandstone. The surficial deposits overlying the bedrock consist of Quaternary age stratified drift deposits of variable thickness. This material was deposited during the Wisconsin stage of glaciation and consists of assorted sand, gravel and clay deposits.

2.1.2 Site Geology

Soil borings performed during the site investigations were completed to a maximum depth of 22 feet. Based on these borings, 3 distinct strata were observed in the subsurface soil at the site. These include a fill zone which contains a variety of material consisting of brick and concrete fragments,

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cinders, and sand and gravel in a silt and sand matrix. Underlying the fill is gray silty sand which contains occasional layers of silt and gravel and traces of peat. Dark gray organic silt, with occasional layers of peat, sand and gravel is found below the silty sand and extends to the depth of the borings.

A geologic fence diagram was constructed utilizing logs from well borings completed during the Phase I Investigation. The locations of these borings are shown on Figure 3 and the fence diagram is presented as Figure 4. As illustrated in Figure 4, the fill zone ranges in thickness from 4.5 to 10 feet, and reaches its maximum thickness at location MW-10 in the southwestern portion of the West Yard (based on the borings performed). The gray silty sand underneath the fill was observed to vary from 3.5 to 9 feet in thickness at MW-10. This unit thins eastward and is completely phased out between the western and central portions of the site, as it was not observed at any locations east of MW-01, MW-02 and MW-10. The organic silt unit was found to be continuous across the site at depths ranging from 4.5 to 9 feet at MW-10. This deposit and the silty sand above it are most likely lake deposits, which typically have low to moderate permeabilities.

None of the borings conducted during the site investigations were completed to bedrock, and therefore, no information currently exists concerning the bedrock underlying the site. However, test borings completed in 1966 at the site on Doremus Avenue, indicate that sandstone and shale were encountered approximately 90 feet below ground surface in one of three borings completed to 91.5 feet. Unconsolidated deposits consisting of sand, clay, silt and gravel were present in other borings completed to this depth.

2.2 SITE TOPOGRAPHY AND SURFACE DRAINAGE

The surface elevations at the Newark Terminal range from 14.1 feet (above mean sea level) in the southwestern portion of the property to 5 feet in the southeastern portion along the Passaic River. The average slope across the site is approximately 2-3 percent and is toward the east in the direction of the Passaic River. The steepest slope occurs in this area where there is a 5-foot drop in elevation between the garage and locker room areas and the Passaic

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River. There are no streams, creeks or lakes located on the site. However, the Passaic River borders the southeast side of the property. Surface runoff from the West Yard portion of the site flows into catch basins which are connected to the municipal wastewater collection system. Surface runoff in the East Yard is channeled to the oil/water separator located adjacent to the northeast corner of the garage. The separator removes floating oil and sediment from the stormwater prior to its discharge to the Passaic River. The discharge is sampled and analyzed monthly in accordance with the requirements of the New Jersey Pollution Discharge Elimination System (NJPDES) permit in effect.

2.3 GROUND WATER

Ground water at the site exists within the overburden under unconfined (water table) conditions. The depth to ground water ranges from ground surface to approximately 9 feet below ground surface, based on the most recent set of ground water level measurements taken at the site on June 1, 1988. A ground water table contour map was constructed using these measurements and is presented as Figure 5.

As shown on the map, the elevation of the ground water table ranges from approximately 5 feet in the north portion of the site to 7.5 feet in the south portion. The surface of the water table gently slopes toward the northeast which is the direction of ground water flow. Along the southeastern boundary of the site, ground water flow is directed toward the Passaic River. Water table elevation maps were also prepared using water level measurements taken on December 12, 1984 and February 4, 1986. A comparison of these maps to Figure 5 indicate that the configuration and elevation of the ground water surface beneath the site have remained fairly constant.

Due to the proximity of the Passaic River to the site, the possibility of tidal influence on the site ground water was investigated. Continuous ground water level measurements were recorded in monitor wells MW-01, MW-03 and MW-07 on February 10, 1986, and were compared to precipitation data and tidal fluctuations. There were no ground water level changes noted in either of the two

wells closest to the river (MW-03 and 07). Therefore, it was determined that tidal influence on the site ground water is negligible.

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3.0 FACILITY DESCRIPTION

3.1 PROCESS OPERATION

Petroleum products are received at the Newark Terminal primarily via a pipeline system. Occasionally, product is received from barges at a loading dock on the Passaic River and then piped into the proper storage tanks. The petroleum products are stored in 11 aboveground tanks. Sediments that settle to the bottom of the tanks are removed, containerized and then transported for proper disposal.

The petroleum products are dispensed into tank trucks at the Loading Rack for delivery offsite. This procedure is done via a truck loading rack with seven gasoline loading positions and two distillate loading positions.

An oil and water separator is located on site (east yard) and provides gravity oil/water separation for east yard runoff. Effluent is tested in accordance with NJPDES permits in effect. The waste material collected in the oil and water separator (floating oils and any sediments) are collected, containerized and disposed in accordance with New Jersey State laws.

The drum storage area located in the West Yard has been paved since operations commenced on site. This pad is used to store containerized waste and other liquids prior to transportation. In 1980, a six-inch asphalt curbing was installed to contain spills and/or surface water runoff. Surface water originally drained south from the drum storage pad to a storm water discharge area west of the warehouse. However, this was eliminated several years ago and no drainage is presently allowed from the drum storage area.

The automotive repair building, the warehouse and the foam building are the only three building structures located in the West Yard. The repair building is used to maintain and repair trucks used in the transportation of petroleum products. The warehouse is used to store supplies necessary for operation. The foam building contains foam used to fight chemical fires.

Two office buildings, a garage and a locker room are located in the East Yard. These buildings are used by the Newark Terminal's personnel for office space, changing facilities and automotive storage. A foam building is also located in the East Yard.

3.2 STORAGE FACILITIES

The following list contains information on the content and size of storage tanks labelled A through M.

Tank # East Yard

A. One 275-gallon aboveground vertical No. 2 Fuel Oil Tank
Steel Construction - Installed 1980

B. One 10,000-gallon aboveground Off Specification Product Tank
Steel Construction - Installed 1972

C. One 8,000-gallon aboveground Gasoline Additive Tank (DMA-4)
Steel Construction - Installed 1968

D. One 550-gallon aboveground Gasoline Condensate Tank
Steel Construction - Installed 1981

E. One 1,000-gallon underground No. 2 Fuel Oil Tank
Steel Construction - Filled with Sand and Cement (late 1970's) - Removed in 1986

F. One 1,000-gallon underground No. 2 Fuel Oil Tank
Steel Construction - Installed 1956

G. One 2,000-gallon underground Diesel Fuel Tank
Steel Construction - Filled with Sand and Cement
Removed in 1986

H. One 2,000-gallon underground storage tank
Steel Construction - Installation date unknown
Removed in 1986

L. One 2,000-gallon underground Loading Rack Residuals Tank
Fiberglass Construction - Installed 1983

West Yard

I. One 1,000-gallon underground Used Truck Motor Oil Tank
Steel Construction - Installed 1981 - Removed in 1986.
Replaced with a 500 gallon underground used Motor Oil Tank
Fiberglass Construction - Installed 1986

J. One 4,000-gallon underground No. 2 Fuel Oil Tank
Fiberglass Construction - Installed 1978

K. One 4,000-gallon underground No. 2 Fuel Oil Tank
Fiberglass Construction - Installed 1982

M. One 2,000-gallon underground Off Specification Product Tank (gas & fuel oil). Fiberglass Construction - Installed 1982

N. One 2,000 gallon underground No. 2 Fuel Oil Tank
Steel Construction - filled with sand (1980)
Partially excavated in 1986

The capacities and contents of the numbered aboveground tank are as follows:

Tank No.	Contents	Capacity (Bbl)
1	Unleaded Premium Gasoline	5,200
2	Kerosene	5,200
3	Fuel Oil	5,200
4	Kerosene	5,200
5	Diesel Fuel	21,000
6	Unleaded Premium Gasoline	21,000
7	Unleaded Regular Gasoline	21,000
8	No. 2 Fuel Oil	21,000
9	Unleaded Premium Gasoline	54,000
10	Unleaded Regular Gasoline	54,000
11	Unleaded Regular Gasoline	54,000

3.3 KNOWN SITE SPILLAGES

According to former Getty personnel, an underground pipe carrying premium gasoline ruptured in the early 1960's. The pipeline and any visibly stained soil was removed from the ruptured area. After backfilling of the area was completed, a new pipeline was installed aboveground (at ground level). This pipeline was eventually removed and replaced with a larger pipeline located approximately 18 feet aboveground. The location of this spill is in the west yard of the plant immediately northeast of the warehouse building.

On October 8, 1981, approximately 1,200 gallons of unleaded regular gasoline were spilled from Tank No. 7 due to a failure of the overflow alarm system (Varec - high, low level alarm). The U.S. Coast Guard, USEPA, and NJDEP were notified immediately, and a private contractor (Auchter Industrial Vacuum Services) was hired to clean up the spillage.

On June 8, 1987, a leak in the diesel receiving line leading to the dock area was discovered when a sheen in the Passaic River adjacent to the Newark Terminal was noted. The United States Coast Guard was notified and a contractor (Clean Venture) was hired to clean up the spillage. Booms and sorbent pads were placed in the shore area to contain the sheen. The pinhole leak was repaired, and several days later the booms and pads were removed, with United States Coast Guard approval.

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4.0 ENVIRONMENTAL AREAS OF CONCERN

Specific areas of the site have been identified as areas of potential environmental concern through past site inspections and investigations. The areas of concern at the Newark Terminal include the diked tank basin areas, unpaved areas (Area A), paved areas which include the West and East Yards and the Concrete Vault. These areas are shown on Figure 6 and are described below.

4.1 TANK BASINS

The tank basins are those areas located within concrete containment walls surrounding Tanks 1 through 11. The 11 aboveground storage tanks were constructed from 1930 to 1944, and the tank bottoms were all replaced approximately 5 years ago.

The 11 aboveground tanks are located within 9 separate tank basins which are separated and surrounded by concrete walls. Tank Nos. 2 and 4, and 1 and 3 are located within 2 basins, respectively.

Past sampling of soil and surface water within the tank basins has shown that elevated levels of total petroleum hydrocarbon (TPHC) and lead exist in these areas. In 1986 and 1987, Texaco initiated an in-situ biodegradation program to reduce the TPHC content within the basins and drum storage runoff area. During this program, the soil within the basins and drum storage surface water runoff area was rototilled. Lime and nutrients were added in an effort to stimulate the natural bacteria to biodegrade the petroleum hydrocarbons present.

4.2 UNPAVED AREAS (AREA A)

Only the aboveground tank basins and the portion of the West Yard known as Area A (Figure 6) are unpaved. Area A is located in the southwestern portion of the site immediately south of Tank No. 9 and the drum storage area. This area was once considered as a site for future tank expansion, however, it was

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never developed for this purpose. This area has never been used for terminal activities. Subsurface investigations in Area A indicate that it is underlain largely by fill material. Some of the soil samples analyzed from Area A indicated elevated levels of TPHC and lead.

4.3 PAVED AREAS

As previously noted most of the site area is paved with bituminous concrete. For purposes of discussion, the paved areas have been divided into the West Yard and the East Yard areas and include the portions of the site outside the tank basins.

4.3.1 West Yard

The paved portions of the West Yard comprise a separate area of environmental concern. In addition to the aboveground fuel storage tanks described in Section 4.1, there are currently 5 underground fuel storage tanks in the West Yard area. These include tanks J, K, M, N, and I (see Figure 6). Former underground tank I was removed in January 1986, and a new fiberglass 550-gallon tank for used motor oil storage was installed in its place. Tank N was abandoned in place and filled with sand in 1980. Tanks J, K and M are still in service. The concrete vault located east of Tank No. 11 is part of the West Yard, however, this area comprises a separate area of concern and is addressed in Section 4.4.

4.3.2 East Yard

The paved portion of the East Yard includes all areas outside the aboveground tank basins. There are currently two underground storage tanks outside the tank basins in the East Yard. These include Tank F, which is a 1,000 gallon No. 2 fuel oil storage tank located at the southeast corner of the northernmost office building. The second tank, Tank L, is a 2000-gallon residual storage tank, located west of the Foam Building. Five additional underground storage tanks, E, G1, G2, H1 and H2, were located in this area previously, and were excavated in January, 1986. During the excavation of Tank G1, adjacent to the Locker Room, a second tank, G2, was identified. Both

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tanks had been abandoned by filling with sand. However, the NJDEP requested that Texaco remove them. A second tank was also encountered while removing Tank H1. This tank is designated as H2 on Figure 6, and like Tank H1, had been abandoned by filling with sand. Both Tanks H1 and H2 were removed at NJDEP's request.

An oil/water separator is also located in the East Yard adjacent to the east side of the garage. Surface water drainage from the East Yard is directed to the separator where sediment and oil are removed by gravity from stormwater prior to being discharged to the Passaic River.

4.4 CONCRETE VAULT

The Concrete Vault is located in the West Yard adjacent to the west side of the Automotive Repair Building (Figure 6). The structure is approximately 40 by 85 feet in size and upon inspection through the manholes on top of the vault, was observed to contain water and miscellaneous building debris. The vault is not used for any operations conducted at the facility and there is little information available concerning the historical usage of this structure.

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5.0 PREVIOUS INVESTIGATIONS

The three phases of the remedial site investigation conducted at the Newark Terminal were performed during the following periods:

Investigation	Dates	Major Field Activities Performed
Phase I	8/1/84-3/2/85	- Installation of 11 monitor wells (MW-01 through MW-11). - Collection of various soil and ground water samples.
Phase II	1/21/86-2/10/86	- Removal of five underground storage tanks (Tanks E, G, H, I and N). - Composite sampling of concrete vault contents. - Installation of two additional monitor wells (MW-12 and MW-13) and sampling of these wells.
Phase III	5/12/88-6/1/88	- Collection of various hand auger and soil boring samples. - Installation of two additional monitor wells (MW-14 and MW-15). - Collection of ground water samples.

5.1 PHASE I INVESTIGATION

The Phase I Investigation conducted at the Newark Terminal consisted of four distinct sampling events. The sampling events were conducted on the following dates:

Sampling Event	Dates	Field Activities Performed
No. 1	8/1/84 and 8/8/84	- Collection of hand auger and soil boring samples. - Collection of surface water samples. - Collection of subsurface water samples for screening purposes.

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No. 2	9/25/84	- Collection of hand auger samples. - Collection of additional subsurface water samples for screening purposes.
No. 3	11/26/84 - 12/10/84	- Installation of 11 monitor wells (MW-01 through MW-11) and collection of ground water samples. - Collection of hand auger and soil boring samples.
No. 4	2/22/85 - 3/27/85	- Leak testing underground tanks. - Additional testing on archived samples. - Priority Pollutant scan of two composite soil samples.

5.1.1 Sampling Event No. 1 (8/1/84 and 8/8/84)

Sampling Event No. 1 was conducted on August 1, 1984 and August 8, 1984. The following samples were collected.

- A total of 18 hand auger samples consisting of:
  - 11 hand auger samples from within the 9 tank basins.
  - 6 hand auger samples from within the drum pad stormwater drainage area.
  - 1 hand auger background sample.
- 4 soil boring samples north of warehouse building in the area of the 1960 underground pipeline rupture.
- 15 standing surface water samples from inside the tank basin areas and stormwater discharge area.
- 1 surface water sample from the Passaic River.
- Subsurface water samples for screening purposes.

5.1.1.1 Sample Locations and Analyses

As previously noted, 18 hand augered soil samples were collected on August 1, 1984. A total of 11 hand augered soil samples labelled N-1 through N-11 were taken within the tank basins. Samples N-1 through N-7 were collected from the East Yard tank basins adjacent to Tank Nos. 1-7, and samples N-8 through N-11 were collected from the West Yard tank basins adjacent to Tank Nos. 8-11. A total of 6 additional hand augered soil samples labeled 1 through 6 were obtained along a chain link fence at the southern property line of the western

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yard adjacent to the southern side of the warehouse building. This area received storm water drainage from a curbed drum storage facility. The last hand augered soil sample was obtained from the southwest corner of the west yard along the fence line. This sample was used as a background sample. For areas where traprock (crushed stone) was encountered, the traprock was cleared to expose the underlying soil before the sample was obtained. Core samples, approximately 6 inches deep, were taken at all sampling locations using a hand auger. Sampling locations from the Phase I Investigation are presented in Figure 7.

A total of 4 soil samples from 4 soil borings labeled B-1 through B-4 were collected from the area of the 1960 gasoline pipeline leak. These soil samples were composite samples collected via split-spoons and ranged in depth from approximately 8 feet to 11 feet. Each boring extended to a minimum of 6 inches below the level of the pipe bedding material. This soil below the pipe bedding was sampled and submitted for analysis.

Standing surface water samples (above existing grade) were collected at locations N-2 through N-11 (adjacent to Tank Nos. 2-11). Surface water samples were collected from the surface water discharge area near the warehouse at Locations 1, 4, 5 and 6. A surface water sample was also collected from the Passaic River.

Subsurface water samples collected during the Phase I Investigation, Sample Event No. 1, were collected approximately 6 inches below the ground surface from a hand auger borehole which penetrated the ground water table. These samples were not collected from monitor wells and were used for screening purposes only. The samples were used to determine whether a ground water monitor program was necessary and to aid the placement of monitor wells.

All soil and water samples were analyzed for volatile organics, petroleum hydrocarbons and lead.

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5.1.1.2 Analytical Results

Analytical data for the soil samples obtained during the Phase I Investigation, Sample Event No. 1 sampling program are presented in Table 2. A review of Table 2 indicates that, of the parameters analyzed, the soil samples contained primarily petroleum hydrocarbons and lead. Levels of petroleum hydrocarbons for samples inside the dikes of the tank basins ranged from 420 millograms per kilogram (mg/Kg) to 230,000 mg/Kg while total lead levels ranged from 36 mg/Kg to 1,000 mg/Kg.

Soil samples from the stormwater discharge area contained petroleum hydrocarbon levels ranging from 4,800 mg/Kg to 28,300 mg/Kg. Lead levels for these samples ranged from 71 mg/Kg to 2,700 mg/Kg.

Soil samples from the 4 soil borings contained petroleum hydrocarbons ranging from 240 mg/Kg to 5,300 mg/Kg and lead levels ranged from 6.2 mg/Kg to 320 mg/Kg.

During Sampling Event No. 1, a soil sample was taken from the southwest corner of the west yard to define background levels of the analyzed parameters. The petroleum hydrocarbon level for this sample was 1,000 mg/Kg, which is higher than two of the soil samples obtained from inside the diked areas.

Although lead was found in certain surface soils sampled, ground water analysis from Sample Event No. 3 indicates very low lead levels (below the National Interim Primary Drinking Water Standard) in all wells, except one background well MW-02 (Table 6).

Analytical data for the surface water samples obtained during Sample Event No. 1 are presented in Table 3. A review of Table 3 indicates that surface water samples obtained from inside diked areas were relatively clean. Lead levels ranged from <0.009 milligrams per liter (mg/L) to 0.96 mg/L. One sample also showed very low levels of toluene, 29 micrograms per liter (ug/L) and ethyl benzene (47 ug/L). Petroleum hydrocarbon levels were <1.0 mg/L except for one sample, which was 1.0 mg/L.

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Analysis of the surface water samples from the stormwater discharge area indicates all but one sample contained 2 mg/L or less of petroleum hydrocarbons. Lead concentrations were low and ranged from 0.018 mg/L to 0.54 mg/L. No significant levels of volatile organics were detected.

The Passaic River water sample showed very low levels of petroleum hydrocarbons (<1 mg/L) and lead (0.018 mg/L). Volatile organics were also not significant.

The subsurface water samples indicate the need for a ground water monitor program. Additional subsurface water samples were necessary for proper selection of monitor well locations.

5.1.2 Sampling Event No. 2 (9/25/84)

Sampling Event No. 2 was conducted on September 25, 1984. The following samples were collected.

- Five hand auger samples adjacent to Tank Nos. 1, 2, 6,7, and 10.
- Additional subsurface water samples used for screening purposes.

5.1.2.1 Sample Locations and Analyses

After reviewing the laboratory data from Sampling Event No. 1, certain areas were resampled. On September 25, 1984, additional soil samples labeled 1A, 2A, 6A, 7A and 10A were collected from within the tank basins at Tank Nos. 1, 2, 6, 7, and 10. The soil samples collected adjacent to Tank Nos. 2, 6 and 10 were analyzed for petroleum hydrocarbons and lead, while the soil samples collected adjacent to Tank Nos. 1 and 7 were analyzed for volatile organics, petroleum hydrocarbons and lead.

5.1.2.2 Analytical Results

Analytical data for Sampling Event No. 2 is presented in Table 4. The petroleum hydrocarbon content and the lead content in the soil samples ranged from 45 mg/Kg to 150 mg/Kg and from 46 mg/Kg to 250 mg/Kg, respectively. Soil

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samples obtained adjacent to Tank Nos. 1 and 7 indicated non-detectable concentrations for volatile organics. The subsurface water samples indicated the possible presence of volatile organics, petroleum hydrocarbons and lead in the ground water. From this information and the analytical results from Sampling Event No. 1 it was determined that a ground water monitor system would be required to obtain a more accurate picture of the ground water quality.

5.1.3 Sampling Event No. 3 (11/26/84-12/10/84)

Sampling Event No. 3 was conducted from November 26, 1984 through December 10, 1984. The following activities were performed.

- Installation of 11 ground water monitor wells (MW-01 through MW-11).
- Collection of 11 ground water samples from these 11 monitor wells.
- Collection of 30 hand auger samples from 15 locations.
- Collection of 4 soil boring samples collected during the installation of monitor well MW-10.

5.1.3.1 Sample Locations and Analyses

The third sampling event at the site involved the installation of 11 ground water monitoring wells labeled MW-01 through MW-11, and the collection of 11 ground water and 34 soil samples. Between the dates of November 26, and December 10, 1984, all ground water monitoring wells were installed and the additional samples taken.

After the well borehole was augered or drilled, each monitoring well was installed. All wells were developed for a minimum of one hour or until ground water was free of sediment. All wells were purged a minimum of three well volumes prior to ground water sampling. Each water sample was collected with a teflon bailer. Ground water samples from each well were analyzed for petroleum hydrocarbons, lead, priority pollutant volatile organics, conductivity, and pH. A total of eleven ground water samples (one from each well) were collected.

Additional hand auger borings were collected within the tank basins adjacent to Tank Nos. 1, 3, 4, 5, 6, 7, 8, 9, 10, 11. These samples were labeled 1B through 11B, respectively. When a second sample was collected adjacent to a tank during this sampling event, the sample was labeled 5C or 9C.

A sample labeled 4C was collected in the stormwater drainage area adjacent to sample 4. A total of 4 samples at 2 locations labeled B-1B and B-2B were collected from the unpaved "Area A". All but one sample location was hand augered in 6-inch increments to a maximum depth of 36 inches or until ground water was encountered. A maximum of 3 samples per location was collected.

The sample location that was not completed using a hand auger was obtained using a two-foot length split-spoon. These soil samples were taken during the installation of monitor well MW-10. Due to additional fill in the area of MW-10, a fourth sample was obtained. All soil samples were analyzed for petroleum hydrocarbons and lead. Soil sample locations 1B (0-6 inches and 12-18 inches), 3B (12-18 inches), 4B (18-24 inches) and 4C (0-6 inches and 12-18 inches) were also analyzed for volatile organics. A field and travel blank were submitted along with the soil samples collected each day as part of the quality assurance requirements.

5.1.3.2 Analytical Results

Analytical data for Sampling Event No. 3 are presented in Tables 5 and 6. A review of Table 5 confirms the levels of petroleum hydrocarbon and lead previously detected in the site soils. Of the 6 soil samples analyzed for volatile organics, two (4B, 18-24 inches and 4C, 0-6 inches) samples were non-detectable. A third sample (3B, 12-18 inches) contained 2330 micrograms per kilogram (ug/Kg) of toluene while the fourth sample (1B, 0-6 inches) contained 728 ug/Kg of benzene. The fifth sample (4C, 12-18 inches) contained 62 ug/Kg of toluene and 97 ug/Kg methylene chloride while the last sample (1B, 12-18 inches) contained 300 ug/Kg of benzene, 554 ug/Kg of ethylbenzene and 4420 ug/Kg of toluene.

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Table 6 provides all analytical results obtained from the 11 monitor wells. A review of Table 6 indicates that of the 11 monitor well samples only 3 monitor wells, MW-02, MW-03 and MW-10, contained volatile organics. These 3 monitor wells contain a total (additive) volatile organic concentration of 161 ug/L, 173 ug/L and 23 ug/L, respectively. However, as shown on the ground water contour map (Figure 5), monitor well MW-02 is a background (upgradient) monitor well which represents the quality of the ground water entering the site from adjacent industrial areas. Monitor well MW-10 is upgradient of all terminal activities and located in an undeveloped portion of the property.

Petroleum hydrocarbon levels in the ground water were between <1 mg/L to 2 mg/L in 10 of the monitor wells (including the 3 background wells). Monitor well number 11 had a petroleum hydrocarbon concentration of 5 mg/L. In addition, the lead concentration in the ground water from the background monitor well MW-02 was 0.08 mg/L. This level is slightly above the NJDEP ECRA ground water guidance of 0.05 mg/L. All other well samples were below this state guidance.

5.1.4 Sample Event No. 4 (2/22/85 - 3/27/85)

The "Site Evaluation Submission (SES) for Environmental Cleanup Responsibility Act, January 1985" prepared for the Newark Terminal, was submitted to the NJDEP in January 1985. This report contains analytical results from the Phase I Investigation, Sampling Event Nos. 1 through 3 and was submitted as part of the requirements under the NJDEP Environmental Cleanup Responsibility Act (ECRA). Based on a preliminary review of this submission NJDEP requested in January 1985 that additional data be provided. Items requested by NJDEP were as follows:

- Past and present pipeline locations.
- Locations of any onsite wastewater disposal facilities.
- Effluent quality monitoring data for discharges from the plant which do not flow to the city wastewater collection system.
- Description of drum storage area.
- History of underground tanks which have been abandoned in place.
- Results of all leak testing performed on underground tanks.

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All of the data requested by NJDEP was included in the "Addendum to Site Evaluation Submission for Environmental Cleanup Responsibility Act, April 1985." This report contains drawings of the abandoned underground 14-inch premium gasoline line which ruptured in the early 1960s. This pipeline was removed and replaced with an aboveground 14-inch pipeline. The abandoned pipeline was located immediately northeast of the warehouse building. Soil borings B-1 through B-4 performed during Sampling Event No. 1 were located in this area to investigate if residuals remained from this spill.

The Newark Terminal does not maintain wastewater disposal facilities. It does operate an oil/water separator which receives storm water runoff from the East Yard only. The separator removes floating oil from East Yard stormwater runoff prior to its discharge to the Passaic River. Monthly sampling of this discharge was conducted by plant personnel. Each sample was analyzed for pH and petroleum hydrocarbons. Available monitoring data from March 1981 through January 1985 were included in the addendum previously referenced.

The drum storage area located in the West Yard has been paved since the commencement of operations on site. In approximately 1980, a 6-inch asphalt curbing was placed around this area. The size, shape, and location of the drum storage area is provided in Figure 7.

To satisfy the requests of the NJDEP, the following field activities were performed.

- Leak testing of all accessible active underground tanks.
- Installation of soil borings around underground tanks that could not be leak tested.
- Perform E.P. toxicity testing on archived Sampling Event No. 3 samples.
- Collection of additional site composite soil samples and discrete ground water samples to be analyzed for a full priority pollutants scan.

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5.1.4.1 Leak Testing of Underground Tanks

During the leak testing phase of Sampling Event No. 4, the following field activities were performed:

- Tanks F, J, K, L, and M were Petro-Tite tested
- A soil boring program was conducted adjacent to Tanks E, G, H, I and N to determine if leakage had occurred.

The underground tanks that were not tested were either located within the aboveground tank basins or within a building. Tanks F, J, K, L and M were Petro-Tite tested for tightness and passed the National Fire Protection Association criteria for critical tank tightness (not exceeding a final hourly leak rate of 0.05 gallons). A copy of these test results is presented in Attachment D of the "Addendum to Site Evaluation Submission for ECRA, April 1985." The remaining five underground tanks (Tanks E, G, H , I, and N) could not be evaluated by the Petro-Tite method and therefore, a soil boring program was conducted for these tanks. The location of these tanks are presented in Figure 7.

The soil boring program was performed to detect leaks from the 5 underground tanks. A total of 23 soil samples were obtained from 13 borings using a hollow stem auger drill rig. The samples were collected at a depth near the bottom of each tank. This sampling was conducted since the tanks could not be tested by conventional means (Petro-Tite or equivalent test).

A total of 4 sample locations per tank, one from each side of the tank would have been ideal. However, due to access restrictions, each tank typically had only three adjacent soil sample locations. Sample depths ranged from 4 feet, 7 inches to 12 feet, 6 inches and were based on actual measurements taken to the bottom of each tank. All sampling locations are presented on Figure 7.

Tank borings were completed by advancing a hollow-stem auger down to a depth approximately 6 inches above the depth of the bottom of each tank. At this point a 2-foot in length, 2-inch diameter split-spoon was driven through the soil a distance of 24 inches. The spoon was then extracted from the soil with the soil core intact inside the split-spoon.

Analytical data for all tank soil boring samples obtained between March 25, and March 28, 1985 are presented in Table 7. A review of data indicates petroleum hydrocarbon concentrations range from 44 to 15,000 mg/Kg in the tank boring samples. A summary of all tank boring analytical results is presented below.

Tank E:

Tank E was located just south of the southern office building in the East Yard. This tank was formerly used to store No. 2 heating oil used to heat the office building. Tank E was taken out of service and filled with sand to within 9 inches of the top in the late 1970s. This action was conducted due to the conversion to electric heating. Tank E was removed during the Phase II Investigation in 1986. Petroleum hydrocarbon levels in the three (3) soil borings surrounding this tank range from 44 mg/Kg (boring E-B1, sample S-1, bottom half of the 7 to 9 foot, 6-inch sample) to 7600 mg/Kg (boring E-B3, sample S-1, top half of the 7 to 9 foot, 6-inch sample).

Tank G (G1, G2):

Tank G was located just north of the locker room-dispatch office in the East Yard. Tank G was used to suppy diesel fuel for the delivery trucks. The fuel supply operation was converted directly to the loading racks. Tank G was abandoned in 1982 and filled with sand to within 30 inches of the top. Tank G was removed during the Phase II Investigation in 1986. Three soil borirgs were completed adjacent to the north, south and west ends of the tank. The east end of the tank was inaccessible due to overhead power lines and a chain link fence. Petroleum hydrocarbon concentrations ranged from 64 mg/Kg (in boring G-B2, sample S-1, top half of the 9 foot, 6-inch to 11 foot, 6-inch sample) to 650 mg/Kg (boring G-B3, sample S-1, bottom half of the 9 foot, 6-inch to 11 foot, 6-inch sample).

Tank H (H1, H2):

Tank H was located west of the locker room-dispatch office in the East Yard. Tank H was used for storing off-specification product. This tank was

abandoned in 1984. Tank H was removed during the Phase II Investigation in 1986. Prior to removal, this tank contained approximately 7 inches of water. A total of 3 soil borings were completed around this tank (northeast corner, south, and west sides). Subsurface obstructions were encountered in borings H-B2 and H-B3. Only grab samples from the auger flights were obtained at these two locations.

Petroleum hydrocarbon levels in the 3 soil borings surrounding Tank H ranged from 72 mg/Kg to 8100 mg/Kg. It should be noted that the two highest concentrations were encountered in the auger flight samples of borings H-B2 and H-B3. Petroleum hydrocarbon concentrations were 1200 mg/Kg and 8100 mg/Kg, respectively for these auger flight samples. In the only boring where split-spoon samples were obtainable (boring H-B1), the petroleum hydrocarbon concentrations were 530 mg/Kg in the 9 foot, 6-inch to 11 foot, 6-inch sample and 220 mg/Kg in the top half of the 11 foot, 6-inch to 13 foot, 6-inch sample.

Tank I:

Tank I was utilized to store used crank-case oil accumulated during normal maintenance of the tank trucks. Tank I was also removed during the Phase II Investigation 1986. Prior to removal, this tank was located immediately west of the automotive repair building in the west yard of the terminal. Soil borings were completed on the north, south, and west ends of the tank. A boring was not completed on the east side of Tank I due to the proximity of the tank to the automotive repair building.

Petroleum hydrocarbon concentrations in the soil samples for the Tank I soil borings were between 730 mg/Kg and 15,000 mg/Kg. Tank I, boring I-B1 only had one split-spoon sample obtained (between the depths of 5 foot, 6-inch and 8 foot, 10-inch). Tank I, boring I-B1, sample S-1 had a petroleum hydrocarbon concentration of 1300 mg/Kg. Tank I, boring I-B2, had two samples analyzed. These were from depths between 5 foot, 6-inch to 7 foot, 6-inch and 7 foot, 6-inch to 9 foot, 6-inch. The petroleum hydrocarbon concentrations measured in these samples were 15,000 mg/Kg and 730 mg/Kg, respectively. Tank I, boring I-B3, also had two samples analyzed. However, these samples were

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obtained from within a two-foot increment (5 foot, 6-inch to 7 foot, 6-inch). The top portion of the sample S-1 had a petroleum hydrocarbon concentration of 2,200 mg/Kg, while the bottom half of the sample S-2 had a petroleum hydrocarbon concentration of 1200 mg/Kg.

Tank N:

Tank N is located immediately south of the automotive repair building in the west yard. Tank N was utilized to store No. 2 Fuel oil. Newark Terminal personnel indicated that water was leaking into Tank N; however, no product loss was recorded. It appears that the tank leaked from the top area of the tank. Tank N was abandoned in 1980 and filled with sand to within 14 inches of the top. Tank N was only partially excavated during the Phase II Investigation in 1986 and was not removed due to excavation complications. Only one soil boring, N-B1, was completed in the area of Tank N. This was due to inaccessibility caused by overhead pipes and structural footings in this area. Petroleum hydrocarbon concentrations were 320 mg/Kg (in the 6-8 foot sample) and 110 mg/Kg (in the 8-10 foot sample).

5.1.4.2 Additional Testing on Archived Sampling Event No. 3 Samples

Additional testing conducted on samples collected during Sampling Event No. 3 are as follows:

- E.P. Toxicity testing on 3 composite samples composed of all 0-6 inch samples, 6-12 inch samples and 12-18 inch samples, respectively, collected from Sampling Event No. 3.

E.P. Toxicity testing was conducted to determine the extent of leachability of metals from the soil contained within the diked area of the tank basins. To evaluate the applicability of reactivity characteristics, total cyanide and sulfide analyses were also performed. The soil composites were prepared in the laboratory from soil samples collected as part of the Phase I Investigation, Sampling Event No. 3. Composites were made from all the 0 to 6 inch, 6 to 12 inch, and 12 to 18 inch samples except the background, monitoring well MW-10 and stormwater runoff area samples (B1-B, B2-B, MW-10, and 4C). The analytical results for the composite samples are presented in Table 8.

A review of the analytical results indicates that metal levels in the E.P. Toxicity leachate for all 3 samples were 2 order of magnitudes less than their allowable levels. This data indicates that the potential for metals to leach from site soils is low and that soils would not be a threat to ground water.

Archived split-spoon samples that were obtained during the installation of each monitoring well were collected primarily to obtain data necessary for preparing geologic logs. These split-spoons were only cleaned between wells and not after each use as the samples were for geologic logs and not for analysis. These archived samples were analyzed for petroleum hydrocarbons. These analytical results are not presented in this document due to the possibility of cross-contamination between samples.

5.1.4.3 Priority Pollutant Screening

For priority pollutant screening selected ground water samples from monitor wells and soil composite samples from the East and West Yards were analyzed. Ground water samples were analyzed for a full priority pollutant scan while the soil composites were analyzed for priority pollutant inorganic and extractable organics. Volatile organic analysis has previously been performed on many soil samples. Most soil samples did not contain a detectable level of volatile organics; therefore, the need for additional volatile organic data was not warranted.

On February 22, 1985, the Phase I Investigation, Sampling Event No. 4 field activities were conducted at the Newark Terminal. During this February 1985 investigation the following sampling activities were performed.

- Collection of 4 ground water samples from existing wells which were analyzed for a total priority pollutant scan.
- Collection of 11 hand auger samples from the East and West Yard tank basins which were then composited into two (2) composite samples. These two sample were analyzed for priority pollutant inorganics and extractable organics.

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The purpose for this additional sampling was to identify as part of the site ECRA investigation priority pollutant constituents which may exist at the site and for which previous sampling programs had not addressed.

Soil:

Soil samples were collected from the Newark Terminal by means of a hand auger sampler. Hand auger soil sampling was conducted at 11 locations, labeled 1D through 11D, on the above referenced date. All sampling locations are shown on Figure 7.

The 11 hand auger soil samples were obtained from inside the diked walls of the 9 tank basins located in the east and west yards of the property. One sample was collected from adjacent to each numbered tank (Tank Nos. 1 through 11).

The 11 soil samples were collected from a depth of 6 inches at a point no closer than 10 feet to the numbered tanks. These samples were then taken back to the laboratory where they were composited, utilizing equal weights from each sample, into two samples (one from the east yard and one from the west yard). The two composite samples were analyzed for priority pollutant inorganics and extractable organics. Analytical data for the two composite soil samples obtained from the Newark Terminal are presented in Table 9.

Copper, lead and zinc concentrations in the composite samples obtained from the East and West Yards were higher than the NJDEP ECRA action limit set for these parameters. The analytical concentrations of the other parameters do not appear to be of environmental significance.

Phenols and cyanide soil analytical results that are presented in Table 9 indicate that these compounds are not found in significant concentrations at the Newark Terminal.

Priority pollutant base/neutral analytical results indicate that eight compounds in the base/neutral scan are present at concentrations ranging from 1.0 mg/Kg to 3.3 mg/Kg in the West Yard soil composite. Only one compound

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(Bis(2-ethylhexyl)phthalate) was present at 3 mg/Kg in the East Yard soil composite.

Six (6) of the compounds encountered in the west yard composite (benzo(b) fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, fluoranthene and pyrene) are associated with heavy oil and coal tar. However, since all of these materials are only found in the west yard (closest to the New Jersey Turnpike), it is possible that the compounds are a result of the high volume of traffic-related air pollution (especially exhaust from diesel powered vehicles) from the New Jersey Turnpike.

Bis(2-ethylhexyl)phthalate was the only component of the base/neutral scan identified in the soil in both the east and west yards of the property. Cross-contamination of this compound is commonly found in environmental samples due to rubber field sampling gloves. The concentrations encountered, 3.0 mg/Kg in the East Yard and 3.3 mg/Kg in the West Yard, do not appear to be of environmental concern.

The base/neutral compound, N-nitrosodiphenylamine, was detected at 2 mg/Kg in the west yard. N-nitrosodiphenylamine is defined in the Merck Index as an "accelerator" for use in vulcanizing rubber. This facility is not now, and has not in the past been involved in processing rubber. Therefore this material is believed to have migrate onto the property. This theory is strengthened by detection of N-nitrosodiphenylamine only in the west yard.

Ground Water:

Ground water sampling of 4 of the 11 onsite overburden wells was conducted on February 22, 1985. The 4 wells sampled were MW-02, MW-03, MW-08, and MW-10. Monitor wells MW-02, MW-03, and MW-10 are located in the west yard while MW-08 is located in the east yard. Monitor well locations were selected so as to provide upgradient background (MW-02, MW-10) and downgradient (MW-03, MW-08) ground water quality data.

Analytical data for the 4 monitor wells sampled on February 22, 1985 are presented in Table 10. A review of this table indicates certain priority

pollutant metals are present at levels above the NJDEP ECRA ground water guidance. There were also base/neutral, acid extractable and phenol constituents detected in various wells.

For the priority pollutant inorganic parameters only arsenic and chromium in MW-03, and lead in MW-02, MW-03 and MW-10 are above the guidance. Arsenic and chromium were detected in MW-03 at 0.06 mg/L whereas the NJDEP ECRA ground water guidance is 0.05 mg/L. The lead levels in MW-02, MW-03 and MW-10 are 0.2 mg/L, 0.1 mg/L and 0.06 mg/L, respectively, whereas the NJDEP ground water guidance is 0.05 mg/L. MW-02 and MW-10 are upgradient wells.

The phenol and cyanide ground water analysis indicates only phenol in MW-02 was at a concentration high enough to be of possible environmental concern (0.14 mg/L). However, due to the geographic location of the terminal and the fact that MW-02 is a background well (the phenol concentration is decreasing as the ground water passes beneath the site), this concentration should pose no environmental concern.

Base/neutral analytical results indicate that naphthalene was detected in MW-08 at a concentration of 26 ug/L. This concentration should be of no environmental concern. Another base neutral component, Bis(2-ethylhexyl)-phthalate, was detected in all 4 of the monitor well samples and the field blank obtained for quality assurance. Only MW-02, (with a concentration of 209 ug/L) and possibly MW-10 (with a concentration of 63 ug/L) are significantly higher than the field blank concentration (35 ug/L) and both of the wells are background locations.

The 4 monitor well ground water samples had non-detectable concentrations of pesticides/PCBs. MW-02, MW-03, and MW-08 had the same, non-detectable results for acid extractable analysis. However, MW-10 (a background well) shows the acid extractable compound 2,4-Dimethylphenol present at a concentration of 34 ug/L.

The compound 2,4-Dimethylphenol is a by-product of coal tar fractioning and coal processing. Some of the man-made sources occurring in this area are asphalt and roadway runoff and fuels. As was previously stated 2,4-Dimethyl-

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phenol was only detected in the background well at the site, and dissipates to non-detectable levels as it passes beneath the site. At 34 ug/L the 2,4-Dimethylphenol appears to be environmentally insignificant.

Volatile organic analysis indicates that only methylene chloride was detected in any of the 4 wells. MW-10 showed a concentration of 6 ug/L of methylene chloride. At this concentration methylene chloride should be of no environmental significance.

5.2 PHASE II INVESTIGATIONS

On September 30, 1985, Texaco received the NJDEP comments and deficiencies to the sampling and analyses previously conducted by at the Newark Terminal. On December 19, 1985, Texaco responded in a document entitled 'Response to NJDEP "Deficiency Letter and Site Inspection Report" dated September 30, 1985.' A Quality Assurance/Quality Control Plan for the laboratory that performed the analytical work for the Newark Terminal was also included in this document. On September 30, 1985, the NJDEP had three major comments, as follows:

1. Leaking underground storage tanks E, G, H, I and N have resulted in soil contamination. These tanks must be excavated and disposed of properly. Contaminated soil around the tanks must be removed and disposed in accordance with the requirements governing its waste classification.

2. The concrete vault on the northwest side of the automotive repair building has not been adequately addressed during the Phase I Investigation. The contents must be sampled and the discharge points must be determined. The original purpose of the concrete vault and its numerous manholes must be established.

3. Hydrogeologic conditions have not been adequately defined. Additional data points are required to accurately develop ground water contours. Continuous ground water level recorders must be used in monitor wells for a one week period to document tidal influence on monitor well data.

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In response to these comments the following field activities were performed between January 21 through February 10, 1986:

Dates	Field Activities
1/29/86	Excavation of Tanks E, G, H, I, and N and removal of adjacent visually contaminated soil.
2/6/86	Collection of one composite water sample from the concrete vault.
1/21/86- 1/22/86	Installation of 2 additional monitor wells (MW-12 and MW-13).
2/10/86	Collection of ground water samples from these 2 wells.
2/4/86	Collection of depth to ground water measurements on all monitor wells (MW-01 through MW-13) to accurately determine the direction of ground water flow.
2/3/86	Continuous monitoring of ground water levels in 3 wells to determine the tidal influence.

The results from the Phase II Investigation were submitted to the NJDEP on September 1986 in a document entitled "Report on Additional Site Investigations and Site Cleanup Activities."

5.2.1 Underground Tank Excavation

On January 29, 1986, Texaco began excavation of the 5 underground storage tanks as requested by the NJDEP. Tanks E, G, H, I, and N were identified for removal along with any visibly oil-stained soil. Texaco hired 2 subcontractors, John Kenny Construction Co. and Angus Vacuum Truck Service to implement the tank removal program. All tank removal activities were conducted under the direction of Texaco. The NJDEP was invited to observe these excavation activities in Texaco's December 1985 response to the NJDEP. Figure 8 shows the location of the excavated tanks and adjacent buildings.

TANK G:

Excavation began with the removal of Tank G, a previously abandoned and sand-filled 2,000 gallon diesel fuel tank. Removal of this tank was hampered by

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abandoned piping adjacent to the tank as well as the proximity to the Heating Ventilation Air Conditioning (HVAC) concrete pad adjacent to the locker room. While removing oil-stained soil and water within the excavation, a second tank was encountered (see Figure 8). This tank was abandoned prior to Texaco's acquisition of the property. Therefore, this tank was not included in Texaco's previous ECRA submittals. This tank was also a 2,000-gallon sand-filled tank which will be referred to hereafter as G-2. Because Tank G-2 was directly beneath the HVAC pad, the tank was removed slowly while sand was added for support of the pad. The excavation was backfilled with sand and compacted for stability.

TANK H:

Tank H, a 2,000-gallon off-specification storage tank situated adjacent to the locker room (Figure 8) was removed next. During the removal of Tank H and related oil-stained soil and ground water, a second tank (1,500-gallon capacity) was encountered. This tank (hereafter designated H-2) had also been abandoned and filled with sand. Removal of this tank was further complicated since the tank was strapped into a concrete-walled vault. Concrete was not detected below the tank bottom. In addition, active sanitary water lines were encountered above this tank. A water line was accidentally broken during the removal of oil-stained soil, and was repaired by John Kenny Construction Co. After removal of the ground water and all practicable oil-stained soil, the excavated area was backfilled with sand and compacted for stability.

TANK E:

After removal of the two tanks in Area H, the next tank identified by the NJDEP for removal was a decommissioned 1,000-gallon No. 2 fuel oil tank designated E on Figure 8. Tank E was partially straddled by a chain-link fence equipped with a security alarm system. Removal of this tank required concurrent backfilling with sand to support the fence as the tank was slowly removed. Although the capacity of this tank was reported to be 1,000 gallors, the dimensions of the tank indicated a capacity of 2,000 gallons. Backfilling and compaction of the sand was performed after removal of stained soil.

TANK I:

Tank I, previously believed to be a 100-gallon used oil tank, was in use prior to excavation. Upon removal of Tank I, it was discovered that it was actually a 1,000-gallon tank.

Tank I was enclosed in a concrete vault similar to that found at Tank H-2. A concrete bottom was not detected. Upon removal of all soil within the vault to a depth of approximately eight feet, pea gravel was placed within the vault for the installation of a new 550-gallon fiberglass tank. The installation of the tank was performed under the observation of the Newark Fire Marshall.

TANK N:

The last tank requested by NJDEP for removal was Tank N, a decommissioned 2,000-gallon No. 2 fuel oil tank that was filled with sand. Upon initial investigation, it was observed that footings to the overhead piping superstructure rested adjacent to this tank. John Kenny Construction Co. would not remove this tank unless written authorization was given, removing potential liability from their company. Texaco visually inspected the area around the tank by scraping away the surface material. The on-site engineer for Texaco halted excavation because of the structural instability of the overhead piping. From the surficial excavation that was performed the tank appears to be greater than 2,000 gallons, possibly as large as 4,000 gallons. Tank N was never completely excavated and removed from the site.

Classification of Excavated Soil:

During the excavation operations, one sample was collected for waste classification testing from every 20 cubic yards of excavated soil. Each sample was analyzed for E.P. Toxicity (metals only), total petroleum hydrocarbons, PCB content, corrosivity, pH, ignitability, cyanide, and sulfide content. In addition, one sample was obtained area adjacent to Tank N after surficial excavation. This sample was analyzed for petroleum hydrocarbons. A summary of the waste classification analytical data is provided in Table 11.

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A total of 80 cubic yards of excavated soil was placed in separate 20 cubic yard piles on plastic. The excavated soil was then covered with plastic to prevent erosion. Texaco submitted the results of the waste classification analyses to the NJDEP for review and the material was classified as I.D. 27 and has since been shipped off-site to a state authorized landfill.

5.2.2 Concrete Vault Investigation

A thorough investigation was conducted to determine the original purpose of the concrete vault located behind the automotive repair building. Plant drawings and the City of Newark, Building Inspector's records for the facility were checked, however, no information of the vault area could be found. A retired Getty Terminal superintendent was contacted who had worked at the facility for 30 years. This former employee indicated that the vaults or manways had existed prior to Getty's purchase of the facility in the 1940's. He believed they were installed by ARCO, the former owner, however, none of the Getty employees ever knew the specific use for the manways. This former employee stated that based on previous excavations and pipe installations conducted over the years near the vault area, no outlet pipes from this area exist. A number of the vaults had been filled with construction and demolition debris.

On February 6, 1986, a total of 6 samples were collected (one water sample from each of the 6 manholes) from the concrete vault. These 6 samples were analyzed for benzene, toluene, ethylbenzene and xylene. Results of these analyses indicated that all samples were non-detectable for each parameter except for a 10 ug/L spike of benzene from one sample. To further ensure that the vault area was of no environmental significance, one composite sample was obtained by mixing water samples from each manhole. These samples were composited equally by volume in the field. The composite sample was analyzed for priority pollutants plus 40. Lead was detected at a concentration of 0.06 mg/L. All other metals, pesticides, PCBs, acid and base/neutral extractables, and volatile organic compounds were not present at detectable levels.

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5.2.3 Hydrogeologic Investigation

As requested by the NJDEP ("Deficiency Letter and Site Inspection Report, September 30, 1985"), Texaco installed 2 additional ground water monitoring wells (MW-12 and MW-13) at the locations specified by the NJDEP geologist.

Monitor well MW-12 was installed outside the dike wall near the northwest corner of Tank No. 1. This area was chosen due to elevated concentrations of volatile organics detected in subsurface water screening samples collected during the Phase I Investigation.

The monitor well MW-13 was installed in the north corner of the automotive repair building in the vicinity of the waste oil Tank I due to previous findings of soil contamination in this area.

The two wells were installed by Environmental Drilling Inc. on January 21 and 22, 1986. Ground water from monitor well MW-12 (near Tank No. 1) was to be analyzed for benzene, toluene, ethylbenzene, xylene and petroleum hydrocarbons. Ground water from monitor well MW-13 (near the automotive building) was to be analyzed for petroleum hydrocarbons and priority pollutant metals.

On February 10, 1986, monitor wells MW-12 and MW-13 were sampled. The ground water samples were not filtered, thus a total priority pollutant metal concentration rather than a soluble metal concentration is presented in the analytical results. These results are presented in Table 12.

The ground water sample from monitor well MW-12 indicated a total (additive) volatile organic concentration of 1.5 mg/L and a petroleum hydrocarbon concentration of 2 mg/L. The ground water sample from monitor well MW-13 indicated non-detectable levels of petroleum hydrocarbons and all priority pollutant metals except lead (0.1 mg/L).

On February 4, 1986, depth to ground water measurements were taken from monitor wells MW-01 through MW-13 except MW-10 for the purpose of generating a

ground water contour map. Monitor well MW-10, located east of the adjacent automobile junkyard, was inaccessible for measurement since accessibility can only be obtained through this automotive junkyard which was closed on this date. The ground water contour map generated in 1986 is contained in the document entitled "Additional Site Investigations and Cleanup Activities" dated August 1986. The 1986 contour map is not significantly different from the 1988 ground water contour map presented in Figure 5. Based on the data, ground water flow direction is to the northeast.

On February 3, 1986, Texaco installed 3 continuous water level chart recorders on monitor wells MW-1, MW-3 and MW-7 in an effort to determine tidal influence. As requested by the NJDEP, the Stevens Water Level Recorder-Type F was utilized which charts water fluctuations using a flotation/countersink pulley system of measurement. A 5 to 1 ratio was used for monitoring, therefore, a sensitivity on the vertical scale of 0.05 feet per smallest increment on the chart was obtained (see Figure 9). Each Stevens recorder was mounted to the well and securely locked twice to prevent tampering. Plastic covers were used over each mounting to prevent precipitation from entering the well.

All precipitation that fell during the week of February 10, 1986 was in the form of snow. Precipitation data were obtained for the Newark area from the National Climatic Center in Asheville, North Carolina and have been recorded on Figure 9.

Tidal influence at the Newark Terminal was found to be insignificant. A ground water elevation change of 0.30 inches was noted in MW-1. No change was noted in MW-3 and MW-7. Therefore, tidal influence on site ground water was negligible based on the measurements obtained.

5.3 PHASE III INVESTIGATIONS

The Phase III Investigation was performed in response to the NJDEP January 1987 comments on the Phase II Investigation Report issued in September 1986. NJDEP requested additional sampling to fully characterize the site and determine the extent of contamination. Texaco submitted a Revised Sampling and Analysis Plan (RSAP) to NJDEP on July 27, 1987 which included the proposed

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field activities for the Phase III Investigation. The field investigation for Phase III was initiated on May 12, 1988 and was completed on June 1, 1988.

Field activities performed during the Phase III investigation are as follows:

Dates	Field Activities
5/12/88 - 5/13/88	Collection of 96 hand auger soil samples; 94 samples within the nine tank basins and 2 samples from the stormwater discharge areas.
5/26/88 - 5/27/88	Collection of 35 soil samples from 11 soil borings located in the unpaved Area A.
5/26/88 - 5/27/88	Collection of 18 soil samples from 16 soil borings located in the areas of the underground tank excavations.
5/26/88 - 5/27/88	Collection of 2 background soil samples from 2 soil borings located in the northern section of the east yard.
5/25/88 - 5/27/88	Installation of 2 additional monitoring wells.
6/1/88	Collection of ground water samples from 15 onsite monitor wells.

On August 11, 1988, Texaco submitted to the NJDEP a document entitled the "Revised Sampling and Analysis Plan (RSAP) Report for Texaco Refining and Marketing Inc., at the Former Getty and Marketing Company Site, Newark, New Jersey, ECRA Case #84455," dated August 11, 1989. This document contains a summary of the Phase III Investigation and all boring logs, analytical data sheets and quality assurance/quality control package associated with this investigation.

After reviewing the RSAP Report, the NJDEP requested the collection of additional background samples to be analyzed for total petroleum hydrocarbons. A total of 10 additional background samples were collected in February, 1989.

5.3.1 Tank Basins

The tank basins are those areas located within concrete containment walls surrounding Tanks 1 through 11. The site contains nine tank basins designed to contain the total volume of the product held within each above ground tank should a release occur. Since the basins are physically separated by the concrete walls, each basin was sampled as a separate area of concern. Hand auger soil sampling was performed in the tank basin areas utilizing a grid system. Soil sampling points in the seven larger basins were selected based on a 50-foot by 50-foot grid system. The two smaller basins were gridded on a 25-foot by 25-foot system. A total of 96 hand auger soil sample points were marked with wooden stakes prior to initiating sampling. The locations of sixteen sampling points within the basins were slightly adjusted off the grid system due to the presence of ponded water or obstructions. The locations of all sampling points are shown on Figure 10.

Hand auger samples were collected at 6-inch intervals until ground water was encountered. Standing surface water impeded sampling in ten locations. Samples were collected at 6-12 inches and 18-24 inches below grade, unless ground water was encountered above 18 inches. If this condition existed samples were then collected 6 inches above ground water. Ground water was encountered from 0 to 28 inches below grade.

Ground water was encountered at a higher elevation than expected due to above normal precipitation during the month of May. The number of increments collected for analysis at each sampling location was dependent on the depth to ground water. All samples collected were analyzed for total petroleum hydrocarbons (TPHC) and lead. These analytical results are presented on Table 13. At hand auger location 77, the sample was also analyzed for base/neutrals and priority pollutant metals. The analytical data for the hand auger soil sample at location 77 is presented in Table 14.

5.3.1.1 West Yard Tank Basins

Tank Basin No. 10:

A total of 11 hand auger samples were obtained from locations 1 through 15 in the tank basin centered around Tank No. 10. Ground water was encountered between 0 and 15 inches below ground surface. All samples were analyzed for TPHC and lead. TPHC concentrations ranged from 110 mg/Kg to 14,000 mg/Kg. Lead concentrations ranged from 30 mg/Kg to 660 mg/Kg in this area.

Tank Basin No. 8:

A total of 7 hand auger samples were collected from locations 16 through 22 in the tank basin centered around Tank No. 8. The maximum sample depth was 18 inches and the depth to ground water ranged from 0 to 18 inches. Concentrations of TPHC ranged from 7 mg/Kg to 8,200 mg/Kg. Lead concentrations ranged from 19 to 850 mg/Kg.

Tank Basin No. 9:

A total of 13 hand auger samples were obtained from locations 23 through 35 in the tank basin centered around Tank No. 9. The maximum depth to ground water was 20 inches and the maximum sample depth was 18 inches. Total petroleum hydrocarbon concentrations ranged from 22 mg/Kg to 6,600 mg/Kg. Lead concentrations ranged from 22 mg/Kg to 1,400 mg/Kg.

Tank Basin No. 11:

A total of 16 hand auger soil samples were collected from locations 36 through 49 in the basin surrounding Tank No. 11. The maximum depth to ground water in this basin was 24 inches. The maximum sample depth was also 24 inches. TPHC concentrations ranged from less than 22 mg/Kg to 12,000 mg/Kg. Lead was detected at concentrations ranging from 3.5 mg/Kg to 1,200 mg/Kg.

5.3.1.2 East Yard Tank Basins

Tank Basin No. 5:

A total of 12 hand auger soil samples were obtained from locations 50 through 58 in the tank basin centered around Tank No. 5. The maximum sample depth was 24 inches and ground water was encountered at a depth ranging between 6 and 28 inches. TPHC concentrations ranged from 26 mg/Kg to 11,000 mg/Kg and lead concentrations ranged from 140 mg/Kg and 2,000 mg/Kg.

Tank Basin No. 6:

A total of 5 hand auger soil samples were collected from locations 59 through 64 in the tank basin centered around Tank No. 6. The maximum sample depth was 12 inches and ground water was encountered at a depth ranging between 0 to 12 inches. TPHC concentrations ranged between 36 mg/Kg and 150 mg/Kg and total lead concentrations ranged between 62 mg/Kg and 830 mg/Kg.

Tank Basin Nos. 2 and 4:

A total of 16 hand auger samples were obtained from locations 65 through 76 in the tank basin centered around Tank Nos. 2 and 4. The maximum sample depth was 24 inches, and depth to ground water ranged between 12 and 26 inches. TPHC concentrations detected ranged from 150 mg/Kg to 38,000 mg/Kg, and total lead concentrations ranged from 5.6 mg/Kg to 1,800 mg/Kg.

Tank Basin No. 7:

A total of 4 hand auger samples were collected from locations 77 through 82 in the tank basin centered around Tank No. 7. The maximum sample depth was 12 inches and the ground water depth ranged from 0 to 12 inches. TPHC concentrations ranged from 36 mg/Kg to 410 mg/Kg and total lead concentrations ranged between 17 mg/Kg and 210 mg/Kg.

Tank Basin Nos. 1 and 3:

A total of 14 hand auger samples were obtained from locations 83 through 94 in the tank basin centered around Tank Nos. 1 and 3. Maximum sample depth was 12 inches and the depth to ground water ranged between 6 and 15 inches. TPHC concentrations ranged from 32 mg/Kg to 39,000 mg/Kg and total lead concentrations ranged from 85 to 1,500 mg/Kg.

Stormwater Runoff:

A total of 2 hand auger soil samples were obtained (95 and 96) to evaluate the former stormwater runoff area generated by the drum storage area. TPHC concentrations were 75 mg/Kg and <45 mg/Kg, respectively. Lead concentrations were 36 mg/Kg and 59 mg/Kg, respectively.

5.3.2 Unpaved Area A

Based on NJDEP's request for further investigation of the unpaved area of the West Yard, designated as Area A, soil samples were taken and analyzed for petroleum hydrocarbons and total lead. Area A is composed largely of fill material and it was at one time considered an area which could be developed for future tank expansion.

A total of 11 soil borings (SB-1 through SB-11) were performed using a drill rig to characterize the soils in Area A. The soil sampling locations are shown in Figure 10. Soil samples were obtained for analysis from continuous split-spoon sampling. Samples were collected at 2 foot intervals through the use of hollow-stem augers and split-spoon samplers. The bottom six inches of each split-spoon sample was submitted for analysis. In all borings, the lower most six inches above ground water was also collected and submitted for analysis. Each boring was drilled to ground water which ranged from 2.5 to 7.5 feet. The majority of Area A is elevated with respect to the overall site and hence ground water was encountered at greater depths. All collected samples were analyzed for petroleum hydrocarbons and total lead content. Analytical results for Area A soil boring samples are presented in Table 15.

The TPHC concentrations in these samples ranged from <21 mg/Kg to 130,000 mg/Kg. Generally, the first sample in each boring (18-24 inches) revealed a substantially higher concentration of TPHC than the other samples (i.e. 42-48 inches and 66-72 inches). Total lead concentrations in Area A ranged from 1.3 mg/Kg to 8,200 mg/Kg. The maximum soil boring depth was seven feet.

5.3.3 Underground Tank Postexcavation Sampling

Subsequent to removal of six underground storage tanks and backfilling of the excavations, Texaco performed underground tank postexcavation soil sampling. This was performed based on NJDEP's request for delineation of the vertical and horizontal extent of these compounds.

A total of 6 soil borings (SB-12 to SB-27) were performed to evaluate soils in the immediate vicinity of the previously removed tanks. The soil sampling locations for these soil borings are shown in Figure 10. In all boring locations, samples were collected 6 inches above the ground water table which was encountered at 2.5 to 3 feet below grade. A total of 2 hand auger samples were obtained for soil boring locations not accessible by drill rig due to overhead electrical lines requiring a buffer zone. These 2 locations have been labeled as SB-26A and SB-27A. Postexcavation samples were collected and submitted for analysis for total petroleum hydrocarbons and benzene, toluene and xylene (BTX).

The range of TPHC concentrations was 320 mg/Kg to 38,000 mg/Kg. Table 16 presents the results of the analytical testing for these areas.

Benzene concentrations ranged from <2 ppm to 12 ppm. Toluene concentrations ranged from <2 ppm to 9.2 ppm. Xylene concentrations ranged from <2 ppm to 35 ppm.

5.3.4 Background Soil Sampling

The NJDEP requested that soil samples be collected for information on background soil quality at the locations shown in Figure 10. Originally, back-

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ground soil samples were collected from soil borings SB-28 and SB-29 at depths of 6-12 inches and 18-24 inches. The background samples were analyzed for total petroleum hydrocarbons and total lead content. Sample SB-28 was also analyzed for benzene, toluene and xylene in the 6-12 inch sample. Table 17 presents the analytical results for these samples. TPHC concentrations ranged from <23 to 4,400 mg/Kg. Lead ranged from 2.7 mg/Kg to 400 mg/Kg. A BTX concentration of 73 mg/Kg was detected in the 6-12 inch sample from SB-28.

After review of the RSAP Report, the NJDEP requested that additional background soil samples be collected. Ten additional background soil samples were collected on both sides of Doremus Avenue. These soil borings were located just outside of the Newark Terminal property line. The samples were analyzed for TPHC. The soil boring locations and analyses are presented in Figure 11.

5.3.5 Hydrogeologic Investigation

A total of 15 monitor wells have been installed to date at the Newark Terminal. A total of 2 additional wells were installed as part of the Phase III Investigation. Upon installation, all 15 wells were resampled. Monitor well MW-14 was installed at the request of the NJDEP as part of the RSAP. Texaco proposed an additional monitor well (MW-15) for background ground water quality in Area A of the site. Monitor wells MW-02, MW-10, and MW-15 are upgradient of the site and will therefore be used to evaluate ground water quality entering the site.

Monitor wells were installed using hollow-stem augers. Soil samples were collected continuously using a 2-inch split-spoon sampler. When ground water was encountered, samples were collected thereafter at 5-foot intervals within the saturated zone. This was done for both soil classification purposes and proper screen selection placement. All soil samples collected were field classified in accordance with the Unified Soils Classification System.

Monitor wells were installed as per NJDEP overburden well specifications. Soil samples collected during the installation of MW-15 from the unsaturated zone were submitted for analysis as part of the sample collection required for

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soil boring SB-9. Upon completion of installation, the wells were developed until their discharge was free of sediment.

On June 1, 1988, 15 ground water samples were collected in accordance with NJDEP specifications. At the request of the NJDEP, each sample was filtered onsite prior to analysis for metals. The NJDEP requested that all samples be analyzed for total volatile organic compounds plus a fifteen peak library search and spiked for xylene, total base/neutral compounds, lead, chromium, and arsenic. Texaco proposed and conducted additional analyses for pH, specific conductance, and petroleum hydrocarbons.

Monitor wells which characterize ground water entering the site (MW-02, MW-10, and MW-15) were found to have levels of volatile organic compounds as follows: MW-10 (307 ug/L) MW-15 (213 ug/L) and MW-2 (ND). Levels in the other 12 wells ranged from non detectable for wells MW-01 and MW-08 to 1,050 ug/L for well MW-11. Other than MW-11, all remaining wells in which volatile organics were detected had levels less than the background wells MW-10 and MW-15.

Background levels for base/neutral compounds were: MW-15 (119 ug/L); MW-10 (11 ug/L) and MW-2 (ND). Other than MW-11 (1,461 ug/L) the remaining well levels ranged from non detectable (MW-1, 5, 6, 8, 9) to 36 ug/L (MW-3).

The background levels of TPHC were: MW-15 (3.2 mg/L); MW-2 (<1.0) and MW-10 (<1.0 mg/L). Only monitor wells MW-9 (4.9 mg/L) and MW-11 (370 mg/L) revealed levels greater than the range of values (<1.0 mg/L to 3.2 mg/L) for the three background wells.

The levels of lead, chromium and arsenic detected in ground water in the background wells and all other well water samples were below the ECRA and National Interim Primary Drinking Water Standards of 0.050 mg/L lead, 0.050 mg/L chromium, and 0.050 mg/L arsenic.

Tables 18 through 20 list the analytical results for the samples analyzed. Figure 5 (previously presented in Section 2.0) is a ground water contour map constructed using water level measurements taken during this sampling event.

6.0 REMEDIAL ACTIVITIES PERFORMED

6.1 UNDERGROUND STORAGE TANK REMOVAL

On January 29, 1986, Texaco began excavation of 5 underground storage tanks (Tanks E, G, H, I, and N) as requested by the NJDEP on September 30, 1985. These tanks were identified for removal along with any visibly oil-stained soil due to elevated levels of petroleum hydrocarbons found adjacent to these tanks. Tanks E, G, H and I were excavated and removed from the site. Due to overhead piping, complications arose during excavation of Tank N. This tank was never completely excavated and removed from the site. However, this tank was decommissioned and filled with sand in 1980.

A total of 80 cubic yards of visually oil-stained soil was excavated during the removal of the underground storage tanks. One sample was collected from every 20 cubic yards of excavated soil and analyzed for waste classification purposes. This material was classified as an I.D. 27 waste and transported to a state authorized landfill.

A detailed description of the excavation and removal of the underground storage tanks is presented in Section 5.2.1 of this document.

6.2 BIODEGRADATION OF TANK BASIN SOIL

Biodegradation of tank basin soil was conducted after the Phase II Investigation between the May 1986 and January 1987. The purpose of the work was to induce maximum biological degradation of petroleum hydrocarbons located within the diked areas of the Newark Terminal.

Diked areas were cleared of any materials which would inhibit the biodegradation operation. This material included bricks, concrete, stones, slag and any other obstructions. The material was collected and disposed off-site at an approved facility.

Biodegradation operations consisted of the following four steps: plowing, disk

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harrowing, rototilling and the addition of nutrients and lime to the soil. Plowing was conducted to a depth of one foot below the surface. This overturned material was then broken up with a disk harrow and mixed by a rototiller. Nutrients and lime were then added to the soil to stimulate biological growth. All areas which were inaccessible to mechanical equipment were turned over and mixed by hand.

Once the initial biodegradation operation was completed, rototilling and the addition of nutrients was conducted on two other occasions. After each event, samples were taken and analyzed for total petroleum hydrocarbons. These results are presented in Figure 12.

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7.0 REMEDIAL ACTION LEVELS

The three phases of sampling and analyses performed between 1984 and 1988 identified specific soils and ground water concerns as described in Section 5.0 of this plan. Based on these data, the following classes of material have been identified:

- Soils
  1) total petroleum hydrocarbons (TPHC)
  2) lead
- Ground Water
  1) TPHC
  2) volatile organics
  3) base neutrals

This cleanup plan proposes to use the remedial action levels set forth in the NJDEP letter of May 22, 1989 to Mr. Howard Phillips of Texaco.

7.1 SOIL REMEDIAL TARGET LEVELS

The proposed remedial programs outlined in Section 8.0 of this report will seek to achieve the following soil remedial levels.

Constituent	Area	Target Level
TPHC	Paved Areas	500 mg/Kg
	Unpaved Areas	500 mg/Kg
	Inside Dike Areas	5,000 mg/Kg
Lead	Site Wide	1,000 mg/Kg
Volatile Organics	Site Wide	1 mg/Kg

Texaco will make a strong and concerted effort to obtain the target level of 500 mg/Kg for TPHC. However, the target level for TPHC beneath paved areas may not be achieved due to the potential presence of dense, low mobility hydrocarbons. If the soil monitoring indicates that the TPHC reduction rate drops to near zero, Texaco will evaluate the nature and mobility of the remaining TPHC and will notify the NJDEP. This evaluation will entail analysis of soil samples and a constituent migration pathway analysis. If it

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appears impractical to reach the desired 500 mg/Kg target, Texaco will initiate an exposure analysis to determine if the remaining levels are of an environmental concern.

7.2 GROUND WATER REMEDIAL TARGET LEVEL

The remedial levels are as follows:

Constituent	Target Level
• Total Volatile Organics:	
NJDEP Group A	5 ug/L per compound
NJDEP Group B-1	50 ug/L per Total Group A & B-1
NJDEP Group B-2	200 ug/L
• Total Base/Neutrals	50 ug/L
• Metals	N.J.A.C. 7:9-6.6, Ground Water Quality Standards (GW2)
• Total Petroleum Hydrocarbons	1 mg/L

These target levels or background levels as monitored in monitor wells MW-02, MW-10 and MWO-15 (whichever is higher), will be the cleanup goals of the ground water remediation. For both soil and water cleanups, as new data become available, the time required to reach acceptable levels will be reestimated, if necessary. In addition, refined judgements will be made as to the final level of cleanup that is technologically practicable. If it appears impracticable to reach and maintain designated levels, either a demonstration will be made that there is no further probability of migration of contaminants or appropriate monitoring or pumping procedures will be initiated to control migration. If this occurs, the plans for discontinuing pumping, continuing pumping, or modifying or adding recovery wells will be submitted to the NJDEP for review and approval.

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8.0 DESCRIPTION OF PROPOSED CLEANUP ACTIVITIES BY AREA OF CONCERN

The investigations and conceptual remedial design generated as part of the Cleanup Plan for the Newark Terminal were created to fulfill Texaco's obligations under ECRA and NJDEP regulations promulgated pursuant to this act.

The three phased investigation conducted between 1985 and 1988 at the Newark Terminal indicated the following five areas of environmental concern.

1) Tank Basins
2) Unpaved Areas
3) Paved Areas
4) Concrete Vault
5) Ground Water

The following section details the cleanup technologies. The cleanup is based on the contaminant levels outlined on the figures submitted to the NJDEP with the Phase III Report. The identified areas of concern and their respective remedial actions are presented below.

Area	Remedial Actions
• Tank Basin	• Selected Excavation and Offsite Disposal
• Unpaved Soil Areas (Area A)	• Selected excavation followed by insitu biodegradation
• Paved Soils Areas	• Soil Venting
• Concrete Vault	• In place closure
• Ground Water	• Pump and Treat (selected area)

8.1 PRE-REMEDIAL ACTIVITIES

Prior to the implementation of remedial activities for the paved, unpaved soil areas and ground water, selected studies will be performed that will provide information needed to determine the feasibility and design parameters of the proposed remedial techniques (i.e. soil venting, in-situ biodegradation and pump and treat). In order to expedite remediation and save time, these

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studies will be performed "at risk" by Texaco prior to the approval of the cleanup plan by the NJDEP.

8.1.1 Hydrogeologic Characterization

Slug tests will be performed on MW-5 and MW-12 to provide preliminary information regarding the aquifer's characteristics.

8.1.2 Pilot Studies

Pilot study work plans are provided within this section for soil venting, and enhanced soil flushing. Texaco proposes that soil venting be the primary remedial technique to remediate the vadose zone underlying the paved areas of the east and west yards. Enhanced soil flushing will be the contingent remedial technique for these areas. A pilot study is required for these proposed remedial techniques. Only the soil venting pilot study will initially be implemented to determine the suitability of this technique. If the ambient temperature reaches below 28°F for a period in excess of 24 hrs. or the water table rises above screened intervals on trenches, the system will be shut down until conditions improve sufficiently to permit a restart. The soil flushing study will be implemented if either of the following two situations occur:

- The results of the soil venting pilot study indicate that ventilation of the vadose zone is not feasible.

- Following the operation of a full scale ventilation system for a period of at least two years, the soil monitoring program indicates that the rate of contaminant degradation drops to near zero and the exposure assessment indicates that the remaining constituent concentrations are unacceptable.

If either of these conditions are met, the scope of work outlined in Section 8.1.2.2 will be implemented.

8.1.2.1 Soil Venting Pilot Study

The following soil venting pilot study work plan is proposed to assess the applicability of soil venting technology to remediate soils at the terminal. The data gained by this study will also be used in the design of a full scale ventilation system.

- Selected Pilot Test Area Background

  The east yard of the terminal has been selected as the site for the pilot test. A full scale soil venting system will be constructed in this area if the pilot test results indicate that this remedial technology is feasible. Asphalt paving covers the entire surface of the area. Previous investigations indicate that the soil adjacent to the former underground storage tanks contains organic materials. At least a portion of the TPHC in the vadose zone is volatile in nature, which makes soil venting an attractive remediation possibility. The activities described in this work plan will study the east area in the vadose zone.

- Scope of Work

  Texaco will perform the following activities at the site to determine the feasibility of soil venting.

  1. One well and three piezometers will be installed in the east end of the terminal near the locker room, at locations which will measure the radius of influence of venting without disrupting facility operations. The locations will be determined in consultation with Texaco and Getty Petroleum Corp., the owner of the property. The well will be constructed of four inch diameter, PVC, 0.020 inch slot well screen from one to five feet below grade, and connected to the surface with four inch PVC casing. The piezometers will be constructed of 2 inch diameter PVC well screen with 0.020 inch slot size, 18 inches long, capped on both ends with Teflon tubing connecting the top of the piezometer to the ground surface. The piezometers will be installed one foot above the capillary fringe,

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expected to be at a depth of approximately three feet below grade. The piezometers will be installed at distances of 10, 20, and 40 feet from the well.

2. The hydrostatic pressure in the well and piezometers will be measured using an inclined manometer.

3. A three horsepower vacuum pump will be connected to the well to draw a vacuum on the soil air. The manometer will be connected to the piezometer closest to the well and monitored until a change in reading indicates that the piezometer is now in the radius of influence of the venting operation. The hydrostatic pressure will then be measured on all points in (1) above, and every five minutes thereafter until the vacuum readings stabilize.

4. In conjunction with the pressure measurements in (3), the soil air exhaust from the vacuum pump will be analyzed by a field instrument (either PID detector system or HNU) to estimate the concentration of volatile organic materials in the exhaust gas.

5. Upon completion of field testing and analysis, a final design for remediation of the vadose zone soils in this area will be completed.

6. Assuming that the pilot test indicates that soil venting is appropriate for this area of the site, an air circulation design will be completed. The pilot test will provide a basis for vacuum pump selection, trench locations across the area, and the degree of makeup air required for the pump and the subsurface. Given the depth to water in this area (shallow water table), it is likely that an air removal trench would be installed below the paving between the river and the loading rack. A trench would also be installed perpendicular to the river north of the rack area.

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8.1.2.2 Soil Flushing Pilot Study

If soil venting fails to achieve the desired results, the soil flushing pilot study will be implemented. This study entails collecting five soil cores from the east yard and three cores from the west yard for testing. The laboratory analyses will be used to determine the water flushing characteristics of the soils and the removal rate of hydrocarbons. Ground water will be collected from the site to to be used as the flushing medium. This testing will provide an assessment of the effectiveness of water flushing on these materials. See Section 8.4.1.3 for a description of the operations as part of this plan.

8.1.3 Biodegradation Bench-Scale Study

In-situ biodegradation is proposed for the unpaved area (Area A). A bench-scale study is required prior implementing remedial actions.

Five soil core samples will be collected from Area A and tested to determine: the microbial populations of total heterotrophic and hydrocarbon-degrading bacteria; the soil nitrogen and phosphorus contents; and pH and lime requirements. These test results will indicate the initial soil loadings of nutrients and lime to optimize the biodegradation rate of the contaminated surface soils found in Area A.

8.2 TANK BASINS

The following sites around the diked areas contain concentrations of TPHC and/or lead above the soil remedial levels outlined in Section 7.0. These areas will be remediated by excavation of the soil about the select hand auger boring locations listed below followed by offsite disposal of the excavated soils. The remedial areas along with associated remedial activities are presented in Figure 13. These remedial areas are:

Hand Auger Soil Boring Location	Contaminant
• 14, 18, 31, 46, 52, 70, 71 and 90	• TPHC
• 26, 41, 43 55, 68 and 87	• Lead
• 69, 74 and 84	• Lead • TPHC

Texaco will obtain all necessary permits and plans required to implement the proposed soil treatment program.

8.2.1 Soils Excavation

The soils located within an adjacent to the aforementioned boring locations will be excavated, removed and backfilled with clean sand. Excavation within this area will be difficult since these areas are contained by an eight foot high wall (spill protection dike) and contains product transfer piping. Therefore, the soil will be removed by hand using shovels. All excavations within the diked areas will be monitored for Health and Safety protection. The excavated material will be placed in a large bucket, and the bucket will be taken from the diked area with a truck crane. The vertical extent of excavation will proceed until ground water is encountered which is expected to be approximately two feet below grade. The lateral extent of excavation will continue around the boring location until all visual signs of contaminated soils have been removed or HNu readings do not indicate elevated level of petroleum hydrocarbons. Postexcavation samples will then be taken to determine if the remedial criteria have been met. Excavation will continue laterally until the criteria are met or access is limited due to structural concerns (i.e., footings, pipes, or walls).

The excavated soil will be sampled for waste classification and secured for eventual offsite disposal. The excavated area will be backfilled in the same manner that the soil was removed. The backfilled material will be loaded into a bucket, hoisted over the dike with a truck crane and spread out using

shovels.

There are two localized soil areas (70 and 90) within the diked areas of Tank Nos. 1, 2, 3, and 4 which contained TPHC concentrations over 30,000 mg/Kg. These areas are to be excavated by hand and staged separately from the other excavated soil described above. The depth of excavation will be to ground water which is approximately one foot nine inches below grade in this area. The excavated material will be removed with the help of a truck crane and bucket since the dike is eight feet high. The soil will be staged and secured outside the dike in the west yard and sampled. The samples will be analyzed for disposal characterization and will then be removed for offsite disposal.

8.2.2 Postexcavation Sampling

Following the removal of visually stained soils, post excavation samples will be taken along the sidewalls of the excavation. No post excavation samples will be collected along the bottom of the excavation where the excavation bottom will be at the ground water table. If sufficient space (>6") exists between the excavation bottom and the ground water table, one post-excavation sample will be taken for every 100 sq. ft. of bottom area. A sidewall sample will be collected every 15 sq. ft. of wall surface and will be selectively analyzed for TPHC and/or lead. Those areas which are excavated solely due to lead concentration which exceed the remedial criteria will have the postexcavation samples taken from that area analyzed for lead only. The same postexcavation analyses strategy will be applied to those excavations solely due to excessive TPHC levels.

8.3 UNPAVED SOIL AREAS (AREA A ONLY)

The previous discussions on the analytic results have indicated the only unpaved area of environmental concern was Area A. Although Area A was never the site of any production activity by Getty/Texaco, sampling results indicate the presence of is TPHC and of lead within the upper three feet of soil in the area and only in one area is ground water lightly impacted. Given the nature of the contaminant and its close proximity to the surface, Texaco believes insitu biodegradation and selective excavation are the optimum remedial

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methodologies for this area of concern.

The selective excavation will be performed prior to soil treatment to remove soils which contain concentrations of lead over 1,000 mg/Kg. The removal of this soil is necessary as the treatment program will only address TPHC contamination. The area will then be prepared for the treatment program. Preparation will include vegetation removal and the installation of surface runoff controls. The treatment program is expected to last one to two years. Following treatment the area will be revegetated.

8.3.1 Selective Soil Excavation

The excavation program will remove soil which contains lead concentrations over 1,000 mg/Kg. The sampling program indicated only one such area in Area A. The soils about boring SB-10 contain concentrations of lead over 1,000 mg/Kg. The soil about the boring will be excavated to a depth of three feet. The projected amount of initial excavation is approximately 20 cubic yards. Following excavation, postexcavation samples will be taken as described in Section 8.2.2. The postexcavation samples will be analyzed for lead only as the following soil treatment program will address the TPHC that remains.

The excavated soil will be secured along with the soil removed from the diked areas that contain concentration of TPHC over 30,000 mg/Kg. The soil will then be sampled for waste classification and eventual offsite disposal.

8.3.2 In Situ Biodegradation

Following the excavation of the area described in Section 8.3.2, a soil treatment program will be implemented. The soils in this Area A exhibit hydrocarbon staining on the near surface (i.e. less than three feet), so in situ biodegradation (soil treatment) in this area will not involve water recirculation or application. The program will address the TPHC present in the vadose zone (unsaturated soil zone) and the organics in the ground water around the upgradient monitor wells MW-10 and MW-15.

In circumstances where broad areas of shallow soil organics are found, land

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treatment in place to accelerate the natural degradation of these compounds is an environmentally sound and cost-effective alternative to soil removal and disposal. The chemical processes and microbial action that are responsible for the slow breakdown of many organic compounds, including many petroleum products and hydrocarbon solvents, may be enhanced by controlling the oxygen and nutrient supply to the soils through tilling and fertilization. Through this procedure, organic compound levels typically may be brought into compliance with NJDEP remedial guidelines.

The surface treatment process will help to stimulate biological action in the upper portion of the shallow ground water table. Enhanced aeration of the vadose zone and migration of trace amounts of fertilizer down through the vadose zone to the ground water table will enhance the growth of the natural bacterial population in the ground water. Therefore, the surface treatment will cleanse soil and shallow ground water. In addition, the remedial technique will not impact any off-site areas, since the slope of the area will be controlled by grading.

8.3.2.1 Site Preparation

Surface runoff controls will be installed about Area A in accordance with the submitted Soil Conservation Service (SCS) soil erosion control plan. This will be done prior to any remedial activities in the area.

The surface of this area will be cleaned of any debris, degrubbed to remove vegetation and leveled to a 1 percent slope toward the west yard. This slope will serve to divert any runoff into the existing water collection system.

8.3.2.2 Treatment and Monitoring Program

When the treatment area has been prepared as described above and the tests have been completed, the initial loadings of nutrients and lime will be applied to the soils and the area will be tilled using either a tractor and discs or a rototiller. Tilling of Area A will continue on a monthly schedule during the months of April through November to provide aeration of the soils. The climate in this area will not promote active biodegradation during the winter months, as an ambient temperature below approximately 50° F. will

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virtually stop the microbial processes.

At least 20 samples will be collected from an "S" shape pattern and composited into one composite sample per month from April through November. This sample will be obtained across the tilled zone and tested for: nutrients, pH and lime requirements, and Total Petroleum Hydrocarbons (TPHC). These test results will be used to determine the need for nutrients and lime during the treatment operations and to track the remedial progress. The results of these tests will be submitted to the state in the quarterly monitoring report.

When the TPH values indicate that the bioremediation has reached its end point for these soils, the data supporting this claim will be tabulated and provided to the appropriate agencies in support of a closure request for this area.

8.4 PAVED SOIL AREAS

The soils containing constituents below the paved areas (parking lots and operational loading areas) of the east and west yards will be addressed via a soil ventilation remedial program. The ventilation program is designed to stimulate and enhance the natural occurring biodegradation which currently exists in the vadose zone and shallow ground water zone. This program will address the constituents of concern within these areas, namely TPHC and volatile organics.

If the soil venting study indicates that this methodology is not suited to the site or if the monitoring results show that the ventilation remedial program is not achieving the desired results, a remedial contingency program will be implemented. This remedial program is presented in Section 8.4.3.

Texaco will obtain all permits that are required for this remedial action.

8.4.1 East Yard

The remedial program for the East Yard will address the area of the former underground storage tanks locations (UST-E and UST-H1, H2) and the general East Yard parking lot area. It is estimated that three connected air removal lines will be needed to accomplish this task.

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8.4.1.1 Soil Venting Program

As described in Section 8.1.2.1, a pilot test will be conducted to determine the site characteristics necessary to design a soil venting system for this area. A conceptual design (see Figure 13) based on the information currently available would use a series of connected air recovery trenches to withdraw air from the yard. This trench would be two to three feet in depth (approximately one foot above the water table), with the bottom foot containing a 4-inch diameter PVC Schedule 80 0.020 slot well screen along the entire length of the trench, packed in one foot of 3/4 inch gravel. A 4-inch PVC Schedule 80 riser pipe and fittings would be used to connect the piping to a vacuum pump. The surplus soils excavated during the construction of the trenches will be secured on site, analyzed for waste classification, and prepared for offsite disposal.

The air recharge for the eastern half of the east yard would be drawn from the edge of the river; this would permit the entire yard to be treated with minimal site disruption. Air relief wells may be installed for the other system in the western half of the East Yard.

An appropriate vacuum and air treatment system would be designed and installed to process the air from the trenches (See Figure 14). This system would include a vacuum pump, suction water separator, and sufficient controls to permit safe operation of the system in an unattended mode. If the exhaust concentration is likely to be high enough to require treatment, either carbon adsorption beds or other treatment methods would be applied to the pump exhaust to attain the appropriate discharge limits. A stack permit might be required and, if so, would be obtained prior to the commencement of operations.

8.4.1.2 Soil Monitoring

It is anticipated that the venting remedial program will last two years. During this period operations monitoring will be performed in two ways:

1. The vapor concentrations will be measured weekly to determine the effectiveness of the venting and the limit of remediation. Testing will be performed on the pump discharge prior to any air treatment (if required).

2. Five soil cores on a bi-annual basis from across the treatment area will be collected and will be analyzed for TPHC to determine the effectiveness of venting in cleaning the soil. The samples will also be analyzed on an bi-annual basis for volatile organics. This data will be submitted in the quarterly reports as available.

8.4.1.3 Contingency Plan

In the event that soil venting does not achieve acceptable residual hydrocarbon levels in the soil, the air removal trench would be designed to serve as a water injection trench for this area. This method of soil flushing would essentially replace the air flow with water flow from the street area toward the river. The trench along the river would be used to intercept the injected water for treatment prior to reinjection. The pumping rate would be determined by the rate at which water may be drawn from the east end of the site without involving the removal of water from the river. If the testing described in Section 8.3.2 indicates that bioremediation is appropriate for this site, then provision would be made for nutrient and oxygen injection into the recirculated water to promote in situ biodegradation of residual materials. Testing for this area would be conducted to verify the effectiveness of the technology.

8.4.2 West Yard

8.4.2.1 Soil Venting Program

A soil venting similar to that described in Section 8.4.2.1 will be constructed in the West Yard. A conceptual design (see Figure 13) based on the information currently available would use a series of air recovery trenches to withdraw air from the yard. This trench would be two to three feet in depth (approximately one foot above the water table), with the bottom foot containing a 4-inch diameter PVC Schedule 80 0.020 slot well screen along

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the entire length of the trench, packed in one foot of 3/4 inch gravel. A 4-inch PVC Schedule 80 riser pipe and fittings would be used to connect the piping to a vacuum pump. The surplus soils excavated during the construction of the trenches will be secured on site, analyzed for waste classification, and prepared for offsite disposal.

An appropriate vacuum and air treatment system would be designed and installed to process the air from the trenches. This system would include a vacuum pump, suction water separator, and sufficient controls to permit safe operation of the system in an unattended mode. If the exhaust concentration is likely to be high enough to require treatment, either carbon adsorption beds or other treatment methods would be applied to the pump exhaust to attain the appropriate discharge limits. A stack permit might be required and, if so, would be obtained prior to the commencement of operations.

8.4.2.2 Soil Monitoring

Because of the smaller area involved and the lower initial concentrations of constituents involved, it is anticipated the venting program will run two years. During this period operations monitoring will be performed in two ways:

1. The vapor concentrations will be measured weekly to determine the effectiveness of the venting and the limit of remediation. Testing will be performed on the pump discharge prior to any air treatment (if required).

2. Three soil cores will be collected on a biannual basis from around the treatment area and analyzed for TPH to determine the effectiveness of venting in cleaning the soil.

8.4.2.3 Contingency Plan

In the event that soil venting does not provide an acceptable reduction of hydrocarbon levels in the soil, the air removal trench would be designed to serve as a water injection trench for this area. A well would be installed to the east of tank I to intercept the injected water for treatment prior to

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reinjection. The pumping rate would be determined by the data gained during the slug tests. If the testing described in Section 8.3.2 indicates that bioremediation is appropriate for this site, then provision would be made for nutrient and oxygen injection into the recirculated water to promote in situ biodegradation of residual materials. Testing for this area would be conducted to verify the feasibility of the technology.

8.5 CONCRETE VAULT

The concrete vault will be sealed and closed with a concrete sand mixture. Prior to backfilling with concrete, the water within each vault will be pumped to the on-site oil/water separator or removed to an offsite treatment facility. Approximately 190 cubic yards of concrete are estimated to be required to seal the vault.

8.6 GROUND WATER

Based on the Revised Sampling and Analysis Plan Report, ground water quality in the majority of the monitoring wells were consistent with or below background concentrations for total petroleum hydrocarbons (TPHC), base/neutrals and total volatile organics. Monitor well MW-11 contained concentrations above background levels for TPHC, base/neutrals and organics. The adjacent wells MW-3 and MW-5 which are lateral and downgradient do not confirm these levels. Therefore, it appears the area of constituents in the ground water is localized. The elevated levels of TPHC and organics in MW-11 may be a result of a surficial source or spill which may have entered this flush mount well through surface runoff. The area is used by the current owner for storage of trucks awaiting automotive repair and their presence may have contributed to these levels.

8.6.1 Ground Water Remediation

The remediation of the ground water about MW-11 will entail the construction of a standard pump and treatment system (see Figure 13). It is anticipated a single six-inch diameter recovery well will provide a sufficient capture zone to remediate the area. The data gained from the preremedial activities (i.e., slug tests) will be used to adjust the number of wells need, if necessary.

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The ground water will be pumped to a small sump pit station which was constructed a few feet east of MW-11. The effluent in the sump pit will be pumped via the overhead pipe racks to eventual discharge to the public sewer system (Passaic Valley Sewerage Authority). Texaco will obtain any permit which might be required for these remedial activities.

8.6.2 Ground Water Monitoring

To determine if the ground water remedial criteria has been achieved and assess the efficiency of the pumping system, a ground water monitoring program will be initiated following the approval of the cleanup plan. The sampling schedule will be on a biannual basis (see Table 21). The results of that sampling activity along with an updated ground water contour map and a discussion of the data will be incorporated initially in a semi-annual report and later in the quarterly monitoring report.

8.7 QUARTERLY REPORTING

The quarterly report will be submitted to the NJDEP which will detail the progress of the following system:

- Soil venting (Paved Areas)
  - soil samples (per schedule)
  - air monitoring results
- In-situ Biodegradation (Area A)
  - soil samples (per schedule)
  - field activities
- Ground Water Remediation (MW-11)
  - Monthly discharge data

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- Ground Water Contour Map
- Analytical results

A discussion of each system will be contained in the quarterly report.

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9.0 CLEANUP COST SUMMARY

A summary of fixed costs for implementation of the selected cleanup plan. All costs are presented in September, 1989 dollars rounded to the nearest thousand dollars, and include the following:

- Cost for soil removal and associated tasks include labor, equipment, and materials for excavation, transportation and disposal.

- Costs for on-site treatment systems include site preparation. mobilization, equipment and installation.

- Construction management costs computed as 15 percent of the total cost of soil removal and associated tasks, recovery trench and well installation, and treatment systems.

- Operation and Maintenance costs for each remedial system.

- Contingency computed as 10 percent of the total capital cost.

The details of the O&M costs are also presented in this section for a projected 2 year period for in-situ soils treatment, a 2-year period for soil aeration in paved areas, and a 4-year period for ground water recovery and treatment. O&M includes labor, maintenance, fuel, power, health and safety, nutrient mixtures for the in-situ systems, systems monitoring, and reports to the NJDEP. The O&M costs have been incorporated in the cost summary.

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REMEDIAL COST ESTIMATE
NEWARK TERMINAL - NEWARK, NEW JERSEY

Item	Description	Estimated Cost
A.	PREREMEDIAL ACTIVITIES	$38,200.
A.1	Slug tests	
A.2	Soil venting pilot study	
A.3	Insitu Biodegradation study	
A.4	Soil flush pilot study (contingency)	
B.	PROJECT MANAGEMENT AND DESIGN	$93,000.
B.1	System Design	
B.2	Prepare Bid Specifications	
B.3	Permits and SCS Plans	
B.4	Engineering Inspection	
C.	TANK BASINS	
C.1	Soil Excavation (155 cy)	$92,600.
C.2	Post Excavation Sampling • 65 TPHC Analyses • 55 Lead Analyses • 10 Base/Neutrals Analyses	
C.3	Off site Disposal • 40 tons of TPHC (>30,000 ppm) and lead (<10,000 ppm) contaminated soils • 170 tons of TPHC (<30,000 ppm) and lead (<4000 ppm) contaminated soils	
C.4	Site Restoration	
D.	UNPAVED SOIL AREA (AREA A)	$263,000.
D.1	Soil Excavation (7 cy) • offsite site disposal of TPHC (>30,000 ppm) and lead contaminated soils • postexcavation sampling	
D.2	Site Preparation • degrubbing and brush disposal • soil erosion controls	
D.3	In-situ Biodegradation[a] • Equipment Purchase	
D.4	Site Restoration • reseed area • remove erosion controls	

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E.	PAVED SOIL AREAS (EAST AND WEST YARDS)	$155,000.
	E.1 Equipment E.2 Aeration System Construction • 2 ventilation trenches (500 ft total length, 3.5' depth) • Disposal of excavated materials • Surface restoration E.3 Operation, Maintenance, and Monitoring[a]	
F.	CLOSURE OF CONCRETE VAULT (WEST YARD)	$16,000.
	• Removal of aqueous layer and proper disposal • Backfill vault with concrete mixture	
G.	GROUND WATER REMEDIATION	$24,000.
	G.1 Installation of one 6" recovery well G.2 Piping System • controls and valves • pump (15 gpm) • piping and supports G.3 Operation and Maintenance[a]	
H.	GROUND WATER MONITORING	$175,000.
	H.1 Sampling and Equipment H.2 Analytical (see Tables 21, 22 and 23)	
I.	QUARTERLY REPORTING AND CLOSURE REPORTS	$141,000.
	I.1 Preparation of a quarterly report detailing the progress of the soil vent, soil treatment, and ground water recovery program. It is anticipated this task will span over 20 quarters. I.2 Closure reports will be prepared following the completion of tasks	
	GRAND TOTAL	$997,800[a]

NOTE:

[a]The O&M costs have been included in this estimate. The details of the O&M costs are shown on the following page.

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OPERATION AND MAINTENANCE COST FOR ON-SITE BIODEGRADATION SYSTEMS

Task		Annual Cost	Years	Estimated Total
D.	INSITU BIODEGRADATION OF UNPAVED PAVED AREAS (AREA A)			
D.1	Quarterly Sampling and Analyses	$ 39,000	2	$ 78,000.
D.2	Maintenance	3,000	2	6,000.
D.3	Operating Labor	7,000	2	14,000.
D.4	Bioreclamation Materials	5,000	2	10,000.
D.5	Process Monitoring	34,000	2	68,000.
	Total D Subtotals			$176,000.[a]
E.	AERATION OF PAVED AREAS (EAST AND WEST YARDS)			
E.1	Quarterly Sampling and Analyses	$ 6,000	2	$12,000.
E.2	Electrical Power	13,000	2	26,000.
E.3	Maintenance	5,000	2	10,000.
E.4	Operating Labor	20,000	2	40,000.
	Total E Subtotals			$88,000.[a]
G.	GROUND WATER REMEDIATION (EAST YARD)			
G.1	Electrical Power and Discharge Fee	6,000	4	$24,000.
G.2	Maintenance	7,000	4	28,000.
	Total G Subtotals			$52,000.[a]

NOTE:

[a]These costs have been included in the individual costs for each respective remedial system

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10.0 SCHEDULE

Texaco intends to solicit bids from qualified contractors. After bid evaluation, the NJDEP will be notified on the chosen contractor and when activities will proceed.

The cleanup schedule or remedial activities is presented in this section. The start-finish schedule for the off site disposal option is estimated to be 60 months. The estimated duration of the In-situ treatment activities is 24 months. All periods for regulatory approvals are beyond the control of Texaco. To the extent that more time than estimated is required to process and issue permits, the schedule will be extended.

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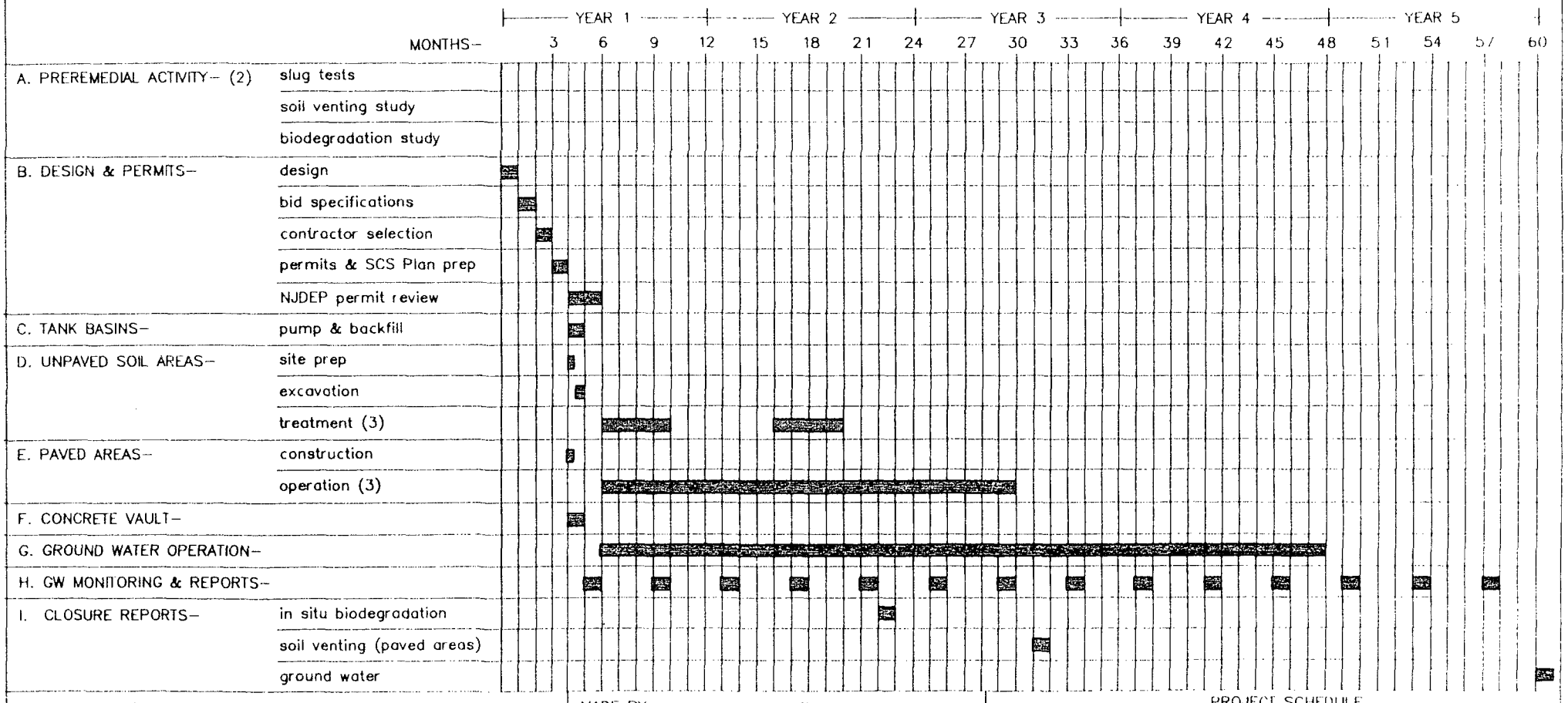
CLEANUP SCHEDULE (1)
Newark Terminal
ECRA Case No. 84455



REMARKS:
(1) The schedule assumes January 1990 to be month number one.
(2) The items under "TASK A" will be performed at 'risk' prior to cleanup plan approval.
(3) If NJDEP permit review extends more than two months, revision to the operation schedule will be necessary.

MADE BY:	L. Frey
CURRENT DATE:	10/6/89
LAST REV DATE:	
DRAWN BY:	J. Reillyhyers
DRAWING No.:	c–JMR\5283601

PROJECT SCHEDULE
Prepared for:
TEXACO REFINING & MARKETING INC.
Newark Facility
Newark, NJ

JOB NO. 528356 | SHEET 1 OF 1

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Tables

TABLE 1

CHRONOLOGY OF MAJOR ACTIVITIES
ASSOCIATED WITH THE NEWARK TERMINAL
FROM OCTOBER, 1984 THROUGH SEPTEMBER, 1989

	ACTIVITY	DATE
1.	Report on the Extent of Contamination Investigation at Newark Terminal for Getty Marketing and Refining Company	October 1984
2.	Site Evaluation Submission (SES) submitted to New Jersey Department of Environmental Protection (NJDEP)	December 11, 1984
3.	General Information Submission (GIS) submitted to NJDEP	January 15, 1985
4.	Texaco/NJDEP meeting to discuss cleanup alternatives and Administrative Consent Order	January 18, 1985
5.	Letter to Texaco from NJDEP indicating deficiencies to Item 2	January 30, 1985
6.	Submission of Addendum to Site Evaluation Submission (Item 2) for Newark Terminal, formerly Getty Marketing and Refining Company	May 6, 1985
7.	NJDEP letter indicating additional deficiencies in Items 2 and 3	May 28, 1985
8.	Site inspection by Environmental Cleanup Reponsibility Act (ECRA) personnel. First assigned Case Manager, Mr. Anil Singh	July 12, 1985
9.	Texaco submittal of report entitled "Laboratory-Scale Simulation of In-Situ Biodegradation"	July 18, 1985
10.	Assigned second Case Manager, Ms. Jane Ten Eyck	September 19, 1985
11.	Texaco receipt of NJDEP Inspection Report Regarding No. 8 and Deficiency Letter	September 30, 1985
12.	Texaco response to Item 11 with proposed sampling plan submitted to NJDEP and a document entitled 'Response to NJDEP "Deficiency Letter and Site Inspection Report," dated September 30, 1985'	December 19, 1985

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TABLE 1 (Continued)

	ACTIVITY	DATE
13.	Initiation of field work in response to Item 11; Installation of two wells, removal of six tanks and soil, monitoring of tidal effects	January 29, 1986
14.	NJDEP letter to Texaco providing deficiencies to December 19, 1985 Sampling Plan (Item 13)	April 6, 1986
15.	Texaco responds to Item 15 submitted to NJDEP	September 12, 1986
16.	"Report on Additional Site Investigations and Site Cleanup Activities" performed to address Sampling Plan deficiencies submitted to NJDEP	September 12, 1986
17.	Air Monitoring Risk Assessment Conducted by E. A. Engineering Science and Technology, Inc., submitted to NJDEP	September 12, 1986
18.	Report of "Risks of Exposure to Chemical Constituents Found in Ground Water, Soil, and Air at the Getty Terminal, Newark, New Jersey" submitted to NJDEP	September 12, 1986
19.	Request for meeting with NJDEP	September 12, 1986
20.	Texaco letter to NJDEP with agenda for the January 14, 1987 meeting between NJDEP and Texaco	January 8, 1987
21.	Texaco and NJDEP meeting to discuss ACO Bond and Site Cleanup, submittal of rototilling/biodegradation results. Third case manager assigned, Mr. Kenneth Hart	January 14, 1987
22.	Letter from NJDEP to from Texaco listing issues discussed at January 14, 1987 Meeting, and requesting additional Sampling Plan	January 30, 1987
23.	Letter to NJDEP from IT Regarding the installation of an additional monitor well	February 13, 1987
24.	Second Letter to NJDEP identical to Item 25	February 27, 1987

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TABLE 1 (Continued)

	ACTIVITY	DATE
25.	Letter to Texaco from NJDEP listing deficiencies to Item 13 and Item 18. Input from the January 14, 1987 meeting was also incorporated	March 17, 1987
26.	Letter to Texaco from NJDEP regarding deficiencies to Item 26	April 21, 1987
27.	Letter to NJDEP from Texaco regarding comments related to Item 27	May 11, 1987
28.	Texaco submittal of Revised Sampling and Analysis Plan to the NJDEP	July 27, 1987
29.	Letter to Texaco from NJDEP providing approval of ground water portion of Item 30	November 4, 1987
30.	IT Letter to Mr. Maurice Migliarino (fourth NJDEP case manager) requesting expedient review of Item 30	January 21, 1988
31.	NJDEP letter to Texaco providing conditional approval with revisions to Item 30	March 11, 1988
32.	Letter to NJDEP from Texaco requesting a formal meeting between Texaco and the NJDEP to discuss comments of the Conditional Approval Letter, Item 33, and Cleanup Options Included was a request for an extension for submission of results of Item 30	April 12, 1988
33.	Letter to NJDEP from IT stating commencement of hand auger sampling and well drilling at site	May 10, 1988
34.	Letter to Texaco from NJDEP stating that a request for an extension for submission of the Sampling Plan Results was granted until August 11, 1988	May 13, 1988
35.	Letter to Texaco from NJDEP regarding additional Revisions to the Sampling Plan Item 30, and providing requirements for the Cleanup Plan	May 24, 1988

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TABLE 1 (Continued)

	ACTIVITY	DATE
36.	Texaco Letter to Elizabeth Mataset (fifth NJDEP case manager) from Texaco requesting a meeting	June 6, 1988
37.	Letter to NJDEP from Texaco acknowledging change of Case Manager and second request for a meeting between IT Corp., Texaco and NJDEP	July 11, 1988
38.	Telephone conversation between IT and NJDEP indicating that a request for a meeting was denied	July 14, 1988
39.	Revised Sampling and Analysis Plan Report and Cleanup Plan Outline Submitted to NJDEP	August 11, 1988
40.	Letter from Kenneth T. Hart of NJDEP to Howard E. Phillips of Texaco containing comments on the Revised Sampling and Analysis Plan Report dated August 11, 1988, and items discussed at December 9, 1988 meeting	May 22, 1989
41.	Letter from Leo J. Frey of IT to Kenneth T. Hart of NJDEP containing response to NJDEP letter dated May 22, 1989 (Item No. 42) and request for extension of due date for submission of Site Cleanup Plan	June 27, 1989
42.	Letter from Karl J. Delaney of NJDEP to J. W. Hearn of Texaco containing response to Texaco comments listed in the IT letter to NJDEP dated June 27, 1989 (Item No. 43) and denial of request for extension of Cleanup Plan submission date	August 22, 1989

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TABLE 2

NEWARK TERMINAL

PHASE I INVESTIGATION
SAMPLING EVENT NO. 1
ANALYTICAL DATA FOR SOIL SAMPLES

Sample Location	Parameters					
	Volatile Organics (ug/Kg)				Petroleum	
Tank Basins (hand auger)	Benzene	Toluene	Ethyl Benzene	Methylene Chloride	Hydrocarbons (mg/Kg)	Lead (mg/Kg)
N-1	2,800	2,150	ND	ND	230,000	770
N-2	ND	ND	ND	ND	56,000	280
N-3	ND	ND	ND	111	4,900	590
N-4	ND	ND	ND	ND	2,400	64
N-5	ND	ND	ND	ND	5,400	460
N-6	ND	ND	ND	ND	3,800	200
N-7	ND	ND	ND	ND	960	120
N-8	ND	ND	ND	ND	7,500	260
N-9	ND	ND	ND	ND	420	36
N-10	ND	ND	ND	ND	8,000	1,000
N-11	ND	ND	ND	ND	2,200	450
Background Sample	ND	ND	ND	ND	1,000	430
Stormwater Discharge Area (hand auger)						
1	ND	ND	ND	122	28,000	2,700
2	ND	ND	ND	ND	4,800	160
3	ND	ND	ND	ND	7,500	760
4	ND	ND	ND	ND	5,800	76
5	ND	ND	ND	ND	14,500	300
6	ND	ND	ND	ND	7,900	71

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TABLE 2 (Continued)

Sample Location	Parameters					
	Volatile Organics (ug/Kg)				Petroleum	
Soil Borings	Benzene	Toluene	Ethyl Benzene	Methylene Chloride	Hydrocarbons (mg/Kg)	Lead (mg/Kg)
B-1, S-3 6'6"-8'0"	ND	ND	ND	ND	5,300	130
B-2, S-3 9'3"-11'3"	ND	ND	ND	1,083	330	6.4
B-3, S-2 9'0"-11'0"	ND	ND	ND	ND	300	33
B-4, S-1 8'10"-9'4"	ND	ND	ND	ND	240	320

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TABLE 3

NEWARK TERMINAL

PHASE I INVESTIGATION
SAMPLING EVENT NO. 1
ANALYTICAL DATA FOR SURFACE WATER SAMPLES

Sample Location	Parameters					
	Volatile Organics (ug/L)				Petroleum Hydrocarbons (mg/L)	Lead (mg/L)
Tank Basin	Benzene	Toluene	Ethyl Benzene	Methylene Chloride		
N-2	ND	ND	ND	ND	<1	0.96
N-3	ND	ND	ND	14	<1	0.39
N-4	ND	ND	ND	ND	<1	0.68
N-5	ND	ND	ND	ND	<1	0.02
N-6	ND	ND	ND	ND	<1	0.15
N-7	ND	ND	ND	ND	<1	0.07
N-8	ND	ND	ND	ND	<1	0.02
N-9	ND	29	47	ND	<1	0.04
N-10	ND	ND	ND	ND	<1	<0.01
N-11	ND	ND	ND	ND	<1	0.12
Stormwater Discharge Area						
1	ND	ND	ND	ND	<1	0.02
4	ND	ND	ND	11	2	0.54
5	ND	ND	ND	ND	2	0.16
7	ND	ND	ND	ND	65	0.12
Passaic River Water	ND	ND	ND	53	<1	0.02

ND = Non detectable

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TABLE 4

NEWARK TERMINAL

PHASE I INVESTIGATION
SAMPLING EVENT NO. 2
ANALYTICAL DATA FOR SOIL SAMPLES

Sample Location	Soil	Parameters				
		Volatile Organics (ug/Kg)				
		Benzene	Ethylene benzene	Toluene	Petroleum Hydrocarbon (mg/Kg)	Lead (mg/Kg)
1A	X	ND	ND	ND	89	94
2A	X	-	-	-	45	150
6A	X	-	-	-	63	46
7A	X	ND	ND	ND	150	110
10A	X	-	-	-	85	250

ND = Non detectable

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TABLE 5

NEWARK TERMINAL

PHASE I INVESTIGATION
SAMPLING EVENT NO. 3
ANALYTICAL DATA FOR SOIL SAMPLES

Sample Location		Parameters					
		Volatile Organics (ug/Kg)				Petroleum	
Sample Location	Increment Inches	Benzene	Toluene	Ethyl Benzene	Methylene Chloride	Hydrocarbons (mg/Kg)	Lead (mg/Kg)
Tank Basin Samples							
1B	0-6	728	ND	ND	ND	13,000	400
	12-18	300	4,420	554	ND	6,200	230
3B	0-6					220	180
	12-18	ND	2,330	ND	ND	1,000	6
	18-24					360	5
4B	0-6					480	330
	12-18					520	400
	18-24	ND	ND	ND	ND	5,600	190
5B	0-6					490	370
5C	0-6					1,230	890
	6-12					520	880
6B	0-6					230	9
	6-12					1,600	470
7B	0-6					140	140
	12-18					5,400	480
8B	0-6					3,000	400
	6-12					1,400	100
9B	0-6					360	1,200
	6-12					330	360
9C	0-6					19	99
	6-12					120	170
10B	0-6					280	210
11B	0-6					37	24
	6-12					210	27
Monitor Well Samples							
MW-10	0-6					1,250	16
	12-18					1,300	80
	30-36					360	110
	8'-8'6"					620	130
Unpaved "Area A"							
B-1 B	0-6					55	24
	6-12					3,100	200
B-2 B	0-6					560	200
	6-12					480	44
Stormwater Drainage Area							
4C	0-6	ND	ND	ND	ND	140	<1
	12-18	ND	62	ND	97	120	<1

932910090

TABLE 6

NEWARK TERMINAL

PHASE I INVESTIGATION
SAMPLING EVENT NO. 3
ANALYTICAL DATA FOR GROUND WATER SAMPLES

	Parameters								
	Volatile Organics (ug/L)					Petroleum Hydro-carbons		Specific conductance	
Sampling Location	Benzene	Chloro Benzene	Toluene	Bromoform	Ethyl Benzene	(mg/L)	pH Units	(umhos)	Lead (mg/L)
MW-01	ND	ND	ND	ND	ND	1	7.5	600	<0.01
MW-02	133	ND	28	ND	ND	2	7.6	350	0.08
MW-03	79	15	79	ND	ND	2	7.9	450	<0.01
MW-04	ND	ND	ND	ND	ND	1	7.6	700	0.01
MW-05	ND	ND	ND	ND	ND	1	7.7	1,100	<0.01
MW-06	ND	ND	ND	ND	ND	1	6.9	1,300	<0.01
MW-07	ND	ND	ND	ND	ND	1	7.1	470	<0.01
MW-08	ND	ND	ND	ND	ND	2	6.8	600	<0.01
MW-09	ND	ND	ND	ND	ND	2	7.1	1,700	<0.01
MW-10	ND	ND	ND	14	9	1	7.3	1,750	<0.01
MW-11	ND	ND	ND	ND	ND	5	7.6	800	<0.01

932910091

TABLE 7

NEWARK TERMINAL

PHASE I INVESTIGATION - SAMPLING EVENT NO. 4
ANALYTICAL RESULTS FOR
TANK SOIL BORING SAMPLES

Sample Location	Sample Depth	Petroleum Hydrocarbons (mg/kg - dry wt.)
TANK E		
E-B1, S-1	7'-9'6" (Top)	300
	7'-9'6" (Bottom)	50
E-B2, S-1	7'-9' (Top)	220
	7'-9' (Bottom)	44
E-B3, S-1	7'-9'6" (Top)	7,600
	7'-9'6" (Bottom)	2,400
TANK G		
G-B1, S-1	9'6" - 11'6"	530
S-2	11'6"-13'6" (Top 6")	220
G-B2, S-1	9'6"-11'6" (Top)	64
	9'6"-11'6" (Bottom)	160
G-B3, S-1	9'6"-11'6" (Top)	85
	9'6"-11'6" (Bottom)	650
TANK I		
I-B1, S-1	5'6"-8'10" (All)	1,300
I-B2, S-1	5'6"-7'6" (All)	15,000
S-2	7'6"-9'6" (All)	730
I-B3, S-1	5'6"-7'6" (Top)	2,200
	5'6"-7'6" (Bottom)	1,200
TANK H		
H-B1, S-1	8'-10' (Top)	630
	8'-10' (Bottom)	72
H-B2, S-1	Sample from Auger Flights (Estimated Depth = 8'2")	1,200
H-B3, S-1	Sample from Auger Flights (Estimated Depth = 4'7")	8,100
TANK N		
N-B1, S-1	6'-8 (All)	320
S-2	8'-10' (All)	110

932910092

TABLE 8

NEWARK TERMINAL

PHASE I INVESTIGATION - SAMPLE EVENT NO. 4
ARCHIVED SOIL SAMPLES
ANALYTICAL DATA FOR E.P. TOXICITY

Soil Composite 12" - 18"

	Concentration (mg/kg - dry wt)	E.P. Toxicity Leachate (mg/l)	EPA Maximum Leachate Concentration (mg/l)
pH (units)	6.7	--	--
% Solids	84	--	--
Arsenic	2.7	<0.01	5.0
Barium	110	0.17	100.0
Cadmium	0.26	<0.002	1.0
Chromium	14	<0.03	5.0
Lead	370	0.04	5.0
Mercury	<1	<0.001	0.2
Selenium	<5	<0.01	1.0
Silver	0.25	<0.002	5.0
Cyanide	<1	--	--
Sulfide	<0.3	--	--

Soil Composite 6" - 12"

	Concentration (mg/kg - dry wt)	E.P. Toxicity Leachate (mg/l)	EPA Maximum Leachate Concentration (mg/l)
pH (units)	6.9	--	--
% Solids	81	--	--
Arsenic	8.5	<0.01	5.0
Barium	240	0.14	100.0
Cadmium	0.94	<0.002	1.0
Chromium	28	<0.03	5.0
Lead	1,000	0.03	5.0
Mercury	<1	<0.013	0.2
Selenium	<5	<0.01	1.0
Silver	1.1	<0.009	5.0
Cyanide	<1	--	--
Sulfide	<0.3	--	--

932910093

TABLE 8 (Continued)

	Soil Composite 0" - 6"		
	Concentration (mg/kg - dry wt)	E.P. Toxicity Leachate (mg/l)	EPA Maximum Leachate Concentration (mg/l)
pH (units)	7.4	--	--
% Solids	80	--	--
Arsenic	8	<0.01	5.0
Barium	290	0.27	100.0
Cadmium	1.3	<0.002	1.0
Chromium	52	<0.03	5.0
Lead	1,000	<0.01	5.0
Mercury	<1	<0.001	0.2
Selenium	<5	<0.01	1.0
Silver	0.65	<0.002	5.0
Cyanide	<1	--	--
Sulfide	<0.3	--	--

932910094

TABLE 9

NEWARK TERMINAL

PHASE I INVESTIGATION - SAMPLING EVENT NO. 4
PRIORITY POLLUTANT ANALYSES
ANALYTICAL DATE FOR COMPOSITE SOIL SAMPLES

Priority Pollutant Inorganics	East Yard Soil Composite Samples 1D-7D (mg/Kg - dry wt.)	West Yard Soil Composite Samples 8D-11D (mg/Kg - dry wt.)
Cyanide	<1	<1
Phenols	0.24	0.3
Antimony	<2	<2
Arsenic	<0.5	<0.5
Beryllium	0.61	0.8
Cadmium	<0.06	<0.06
Chromium	52	44
Copper	250	330
Lead	400	580
Mercury	<0.5	<0.5
Nickel	74	92
Selenium	<0.5	<0.5
Silver	0.6	0.9
Thallium	<1	<1
Zinc	580	540

Priority Pollutant Extractable Organics	East Yard Soil Composite Samples 1D-7D (mg/Kg - dry wt.)	West Yard Soil Composite Samples 8D-11D (mg/Kg - dry wt.)
Base/Neutral Extractables		
Benzo(b)fluoranthene	ND	1.5
Benzo(k)fluoranthene	ND	1.0
Benzo(a)pyrene	ND	1.0
Bis(2-ethylhexyl)phthalate	3	3.3
Chrysene	ND	2.5
Fluoranthene	ND	2.6
n-Nitrosodiphenylamine	ND	2.0
Pyrene	ND	2.7
All other base neutral compounds	ND	ND

932910095

TABLE 9 (Continued)

Extractable Organics	East Yard Soil Composite Samples 1D-7D (mg/Kg - dry wt.)	West Yard Soil Composite Samples 8D-11D (mg/Kg - dry wt.)
Acid Extractable Compounds (by GC/MS)	ND	ND
Pesticide and PCB Compound	ND	ND

932910096

TABLE 10

NEWARK TERMINAL

PRIORITY POLLUTANT ANALYSIS
PHASE I INVESTIGATION - SAMPLE EVENT NO. 4
ANALYTICAL DATA FOR GROUND WATER SAMPLES

Pricrity Pollutant Inorganic (mg/L)	Sample Locations MW-02	MW-03	MW-08	MW-10
Phenols	0.14	0.08	0.09	0.09
Cyanide	<0.03	<0.03	<0.03	<002
Antimony	<0.03	<0.03	<0.03	<0.03
Arsenic	0.05	0.06	0.03	0.1
Beryllium	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	0.001	0.002
Chromium	0.1	0.06	0.04	0.04
Copper	0.04	0.02	0.01	0.04
Lead	0.2	0.1	0.02	0.06
Mercury	<0.002	<0.002	<0.002	<0.002
Nickel	0.02	0.01	<0.01	<0.01
Selenium	<0.01	<0.01	<0.01	<0.01
Silver	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01
Zinc	0.4	0.5	0.04	0.2
Pricrity Pollutant Organics				
Volatile Organics (ug/L)				
Methylene Chloride	ND	ND	ND	6
Other Compounds	ND	ND	ND	ND
Base Neutral (ug/L)				
Bis(2-ethylhexyl) phthalate	209	40	39	63
Naphthalene	ND	ND	26	ND
Other Compounds	ND	ND	ND	ND
Pesticide/PCBs	ND	ND	ND	ND
Acid Extractable				
2,4-Dimethylphenol	ND	ND	ND	34
Other Compounds	ND	ND	ND	ND

932910097

TABLE 11

NEWARK TERMINAL

PHASE II INVESTIGATIONS
UNDERGROUND TANK EXCAVATION
ANALYTICAL DATA FOR WASTE CLASSIFICATION

Sample No.	Station No.	Petroleum Hydrocarbons (mg/kg-dry wt)	E.P. Toxicity (mg/L)								pH	Corrosivity	Ignitability (F)	Reactivity (mg/kg)		Total PCBs (mg/kg - dry wt)
			As	Ba	Cd	Cr	Pb	Hg	Se	Ag				Sulfide	Cyanide	
51417	G-1	8460	<0.001	1.73	0.015	0.029	0.080	<0.001	<0.001	<0.010	7.5	Non-corosive	>150	<20	<1.5	ND
51418	G-2	4963	0.002	0.310	0.012	0.034	0.100	<0.001	<0.001	<0.010	6.3	Non-corosive	>150	<20	<1.5	ND
51394	H-1	1918	0.003	0.590	0.009	<0.025	0.080	<0.001	<0.001	<0.010	6.7	Non-corosive	>150	<20	<1.5	ND
51395	H-2	1273	0.003	1.10	0.022	0.054	0.220	<0.001	<0.001	0.017	9.2	Non-corosive	>150	<20	<1.5	ND
51396	E-1	294	0.002	0.430	0.008	0.036	0.002	<0.001	<0.001	<0.010	9.2	Non-corosive	>150	<20	<1.5	ND
51397	H-1	<25	0.001	1.25	0.014	<0.025	<0.001	<0.001	<0.001	<0.010	6.5	Non-corosive	>150	<20	<1.5	ND
51398	I-1	1487	0.001	0.310	0.016	0.034	0.250	<0.001	<0.001	<0.010	6.4	Non-corosive	>150	<20	<1.5	ND

ENG/LH471-T1

932910098

TABLE 12

NEWARK TERMINAL

PHASE II INVESTIGATION

ANALYTICAL DATA FOR GROUND WATER SAMPLES

Parameters (mg/L)	MW-12	MW-13
Petroleum Hydrocarbons	2.0	ND
Benzene	1.5	-
Ethylbenzene	0.045	-
Toluene	0.1	-
Xylene	0.21	-
Priority Pollutant Metals		
Lead	-	0.1
Other Compounds	-	ND

ND = Non detectable

ENG/LH471-tb12

932910099

TABLE 13

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR HAND AUGER SOIL SAMPLES

Sample Designation	Sample Depth	Analytical Results (mg/Kg)	
Tank Basin Area		TPHC[1]	Pb[2]
Tank No. 10			
1	0-6"	360	230
2	0-6"	2,000	660
3	6"-12"	4,200	60
4	6"-12"	250	30
5	0-6"	310	83
6	4"-10"	2,800	80
7	0-6"	290	53
9	6"-12"	190	550
13	0-6"	800	600
14	6"-12"	14,000	58
15	0-6"	110	180
Tank No. 8			
18	6"-12"	8,200	79
19	0-3"	73	850
20	6"-12"	<22	19
20	12"-18"	<23	760
21	6"-12"	150	210
22	6"-12"	25	130
22	12"-18"	<23	69
Tank No. 9			
23	0-6"	32	520
24	0-6"	25	400
25	6"-12"	35	120

932910100

TABLE 13

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR HAND AUGER SOIL SAMPLES

Sample Designation	Sample Depth	Analytical Results (mg/Kg)	
Tank No. 9 (Cont'd)		TPHC[1]	Pb[2]
26	0-6"	37	1,400
27	6"-12"	3,400	840
28	6"-12"	230	610
29	6"-12"	29	750
31	6"-12"	64	110
31	12"-18"	6,600	22
32	6"-12"	<22	36
33	0-6"	50	760
34	6"-12"	<22	240
35	6"-12"	55	980
Tank No. 11			
36	0-6"	46	75
37	6"-12"	31	12
38	6"-12"	170	790
39	6"-12"	730	360
40	6"-12"	<22	11
41	0-6"	440	1,100
42	6"-12"	71	540
43	6"-12"	53	1,200
44	6"-12"	<22	180
45	6"-12"	130	960
46	6"-12"	700	920
46	12"-16"	12,000	600
47	6"-12"	950	120
48	6"-12"	<22	3.5
48	18"-24"	270	220
49	6"-12"	160	22

932910101

TABLE 13

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR HAND AUGER SOIL SAMPLES

Sample Designation	Sample Depth	Analytical Results (mg/Kg)	
		TPHC[1]	Pb[2]
Tank No. 5			
50	6"-12"	700	510
50	18"-24"	85	140
51	0-6"	190	360
52	6"-12"	11,000	660
52	18"-24"	5,000	240
53	6"-12"	120	200
54	6"-12"	500	530
54	18"-24"	250	280
55	6"-12"	180	2,000
56	6"-12"	79	900
57	6"-12"	130	770
58	6"-12"	26	360
Tank No. 6			
59	0-6"	150	680
60	0-6"	140	830
61	6"-12"	36	62
63	0-6"	77	460
64	0-6"	38	200
Tank Nos. 2 and 4			
65	8"-14"	2,200	64
66	6"-12"	280	200
66	12"-17"	4,000	110
67	6"-12"	420	130
68	6"-12"	460	84

932910102

TABLE 13

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR HAND AUGER SOIL SAMPLES

Sample Designation	Sample Depth	Analytical Results (mg/Kg)	
Tank Nos.2 and 4 (Cont'd)		TPHC[1]	Pb[2]
68	18"-24"	620	1,800
69	6"-12"	8,900	1,000
69	12"-18"	440	130
70	6"-12"	38,000	120
71	6"-12"	11,000	280
72	6"-12"	1,800	630
73	6"-12"	150	830
73	18"-24"	1,800	5.6
74	6"-12"	1,300	1,300
75	0-6"	460	110
76	6"-12"	550	100
Tank No. 7			
77[3]	0-6"	410	190
78	6"-12"	110	210
80	6"-12"	95	21
81	6"-12"	36	17
Tank Nos. 1 and 3			
83	6"-12"	32	85
84	6"-12"	9,900	1,300
85	4"-10"	300	800
86	6"-12"	16,000	820
87	6"-12"	510	1,500
88	6"-12"	120	120
89	0-6"	4,300	580
90	6"-12"	39,000	290

932910103

TABLE 13

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR HAND AUGER SOIL SAMPLES

Sample Designation	Sample Depth	Analytical Results (mg/Kg)	
Tank Nos. 1 and 3 (Cont'd)		TPHC[1]	Pb[2]
91	6"-12"	320	410
92	6"-12"	170	180
93	6"-12"	240	550
94	6"-12"	210	110
95	6"-12"	75	36
96	0-6"	<45	59

[1] - TPHC - Total Petroleum Hydrocarbon Content.

[2] - Pb - Lead

[3] - 77 was analyzed for total base neutrals and metals, Table 4 presents the results for these analysis.

932910104

TABLE 14

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR HAND AUGER SOIL SAMPLE
AT LOCATION 77

	Analytical Results (mg/Kg)	
Analysis	77	Field Blank
Total Base Neutrals	Non-Detectable	Non-Detectable
TPHC	410	<1.0
Antimony	<2.4	<0.02
Arsenic	5.8	<0.01
Beryllium	<0.61	<0.005
Cadmium	1.6	<0.005
Chromium	23	<0.010
Copper	49	<0.020
Lead	190	<0.005
Mercury	<.061	<0.0002
Nickel	13	<0.040
Selenium	<0.61	<0.005
Silver	<0.61	<0.010
Thallium	<1.2	<0.010
Zinc	170	<0.020

932910105

TABLE 15

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR AREA A SOIL BORING SAMPLES

Sample Designation	Sample Depth	Analytical Results (mg/Kg)	
		TPHC	Pb
SB-1	18"-24"	21,000	850
SB-2	18"-24"	2,100	11
SB-3	18"-24"	980	390
	42"-48"	72	35
	66"-72"	300	140
	79"-85"	210	8.8
SB-4	18"-24"	520	980
	42"-48"	530	570
	66"-72"	130	140
SB-5	18"-24"	88	510
	42"-48"	<22	24
	66"-72"	<22	10
SB-6	18"-24"	<32	91
	42"-48"	<20	20
	66"-72"	<24	32
	78"-84"	<21	10
SB-7	18"-24"	<20	49
	42"-48"	<22	7.8
	66"-72"	<23	4.1
	79"-85"	<22	10
SB-8	18"-24"	3,700	550
	42"-48"	63	42
	66"-72"	120	340
	79"-85"	170	19
SB-9/MW-15	18"-24"	530	900
	42"-48"	1,700	800
	66"-72"	<21	9.3
SB-10	18"-24"	130,000	8,200
	42"-48"	250	18
	66"-72"	<20	4.1
	78"-84"	330	83

932910106

TABLE 15 (CONT'D)

Sample Designation	Sample Depth	Analytical Results (mg/Kg)	
		TPHC	Pb
SB-11	18"-24"	180	38
	42"-48"	60	23
	66"-72"	<21	3.6
	79"-85"	45	1.3
Field Blank		<1	<0.005

932910107

TABLE 16

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR
UNDERGROUND TANK POSTEXCAVATION
SOIL BORING SAMPLES

Sample Designation	Sample Depth	Sample Analysis (mg/Kg) TPHC	Benzene	Toluene	Xylene	Depth to Water Table
SB-12	24"-30"	18,000	ND	ND	0.3	2.5'
SB-13	24"-30"	4,600	1.2	ND	6.6	2.5'
SB-14	24"-30"	38,000	1.7	0.5	5.3	2.5'
SB-15	24"-30"	14,000	ND	ND	4.2	2.5'
SB-16	24"-30"	2,600	ND	ND	ND	2.5'
SB-17	24"-30"	7,300	0.4	1.0	3.9	2.5'
SB-18	24"-30"	28,000	1.4	1.2	8.7	2.5'
SB-19	24"-30"	4,300	0.8	0.11	2.2	2.5'
SB-20	24"-30"	13,000	ND	ND	8.0	2.5'
SB-21	24"-30"	14,000	0.6	0.2	20.0	2.5'
SB-22	24"-30"	980	0.06	ND	0.04	2.5'
SB-23	24"-30"	16,000	0.7	ND	3.5	2.5'
SB-24	24"-30"	17,000	12	9.2	35	2.5
SB-25/MW-14	24"-30"	11,000	6.3	4.7	30	2.5'
SB-26	30"-36"	12,000	10	7.5	29	3.0'
SB-27	24"-30"	6,200	0.3	ND	0.8	2.5'
SB-26A[1]	24"-30"	320	NA	NA	NA	2.5'
SB-27A[1]	24"-30"	1,900	NA	NA	NA	2.5'
Field Blank		<1.0	ND	ND	ND	
Trip Blank		ND	ND	ND	ND	

ND - Nondetectable less than 2 ppm.
NA - Not Analyzed.

[1]Sample collected by hand auger.

932910108

TABLE 17

NEWARK TERMINAL

PHASE III INVESTIGATION
ANALYTICAL DATA FOR BACKGROUND SOIL BORING SAMPLES

Sample Designation	Sample Depth	Sample Analysis (mg/Kg)				
		TPHC	Pb	Benzene	Toluene	Xylene
SB-28	6"-12"	280	400	15	10	48
	18"-24"	4,400	140	NA	NA	NA
SB-29	6"-12"	44	2.7	NA	NA	NA
	18"-24"	<23	3.8	NA	NA	NA

1 - Total Petroleum Hydrocarbons
2 - Total Lead Content
NA - Not Analyzed

932910109

TABLE 18

NEWARK TERMINAL

PHASE III INVESTIGATION
GROUND WATER ANALYTICAL DATA FOR
TOTAL PETROLEUM HYDROCARBONS, LEAD, CHROMIUM, ARSENIC, pH
AND SPECIFIC CONDUCTANCE

Sample Designation	TPHC (mg/Kg)	Lead (mg/Kg)	Chromium (mg/Kg)	Arsenic (mg/Kg)	PH	Specific Conductance
MW-1	<1.0	<0.005	0.03	<0.011	6.89	4750
MW-2	<1.0	<0.005	<0.010	0.013	7.25	950
MW-3	1.5	<0.005	<0.010	<0.010	6.85	1300
MW-4	<1.0	<0.005	<0.010	<0.010	7.35	1000
MW-5	<1.0	0.011	<0.010	<0.010	7.00	1200
MW-6	<1.0	<0.005	<0.010	<0.010	6.95	2000
MW-7	<1.0	<0.005	<0.010	<0.010	6.95	1000
MW-8	1.2	<0.005	<0.010	<0.010	7.00	800
MW-9	4.9	0.007	<0.010	<0.010	6.30	1300
MW-10	<1.0	<0.005	<0.010	<0.010	6.95	2000
MW-11	370	<0.005	<0.010	<0.010	6.85	1100
MW-12	1.4	0.010	<0.010	0.015	6.60	1300
MW-13	<1.0	<0.005	<0.010	<0.010	7.15	1200
MW-14	2.1	0.006	<0.010	<0.010	6.80	3300
MW-15	3.2	0.011	<0.010	<0.010	6.95	2300
Field Blank	<1.0	<0.005	<0.010	<0.010	-	-

932910110

TABLE 19

NEWARK TERMINAL

PHASE III INVESTIGATION - BASE/NEUTRAL ANALYSES
ANALYTICAL DATA FOR GROUND WATER

Parameter Base/Neutrals (ug/L)	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	FIELD BLANK
Acenaphthene	ND	ND	ND	ND	ND	ND	15	ND	ND	ND	49	ND	ND	ND	9	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	41	ND	ND	ND	ND	ND
Benzo (a) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16	ND	ND	ND	ND	ND
Benzo (b) fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	ND	ND	ND	ND	ND
Benzo (a) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	ND	ND	ND	ND	ND
Benzo (g,h,i) perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzidene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis (2-chloroethyl) ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis (2-chloroethyoxy) methane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	420	ND	ND	ND	110	ND
Bis (2-chloroisopropyl) ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butyl Benzyl Phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorophenyl Phenyl Ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23	ND	ND	ND	ND	ND
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-3'-Dichlorobenzidene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-Octylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ENG/LH47I-Tbls

932910111

TABLE 19 (Continued)

Parameter Base/Neutrals	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	FIELD BLANK
1,2-Diphenylhydrazine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno (1,2,3,-Cd) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isophorone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	36	ND	ND	ND	ND	ND	ND	11	85	15	ND	11	ND	ND
Nitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-nitrosodimenthylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-nitrosodi-n-Propylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	380	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	16	ND	ND	9	ND	ND	ND	160	ND	22	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	45	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Total Base/Neutrals	ND	ND	36	16	ND	ND	32	ND	ND	11	1,261	15	22	11	119	

932910112

TABLE 20

NEWARK TERMINAL

PHASE III INVESTIGATION
GROUND WATER ANALYTICAL RESULTS FOR TOTAL VOLATILE ORGANIC COMPOUNDS
AND NON TARGET PRIORITY POLLUTANTS

Parameter Volatile Organics (ug/L)	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	Travel Blank
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride[1]	7	13	ND	6	ND	15	13	ND	ND	ND	40	17	ND	7	19	7
Acetone[1]	17	ND	26	16	44	12	59	ND	11	15	ND	ND	37	11	15	130
Carbon Disulfide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Acetate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	13	ND	ND	ND	ND	210	490	ND	ND	39	200	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	69	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	16	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	13	ND	140	14	10	7	38	ND	54	73	560	7	53	21	13	ND
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total Volatile Organic Compounds[2]	13	ND	140	14	23	7	107	ND	54	307	1050	7	53	65	213	ND
	---	---	---	---	---	---	---	---	---	---	-----	---	---	---	---	---
Total Library Search Compounds	137	ND	268	73	52	ND	ND	6	990	477	1900	ND	860	230	1710	ND

[1]Methylene Chloride and Acetone present in method blanks.
[2]Methylene Chloride and Acetone subtracted from total.

932910113

TABLE 21

NEWARK TERMINAL

PROPOSED GROUND WATER SAMPLING SCHEDULE
PRIOR TO INITIATION OF REMEDIAL ACTIVITIES

Months												Analysis	Units
1	2	3	4	5	6	7	8	9	10	11	12		
X						X						Elevation of top of well casing with cap off (all wells on site).	feet MSL: to nearest.01
X						X						Elevation of original ground level (all wells on site).	feet MSL: to nearest.01
X						X						Depth to water table from top of casing prior to sampling with cap off (all wells on site).	feet: to nearest.01
X						X						Depth to water table from original ground level prior to sampling (all wells on site).	feet: to nearest.01
X						X						Total petroleum hydrocarbons	mg/L
X						X						Base/neutrals[A]	ug/L
X						X						Volatile Organics plus total xylenes[A]	ug/L
X						X						Lead[A]	ug/L
X						X						MTBE[A,B]	ug/L
X						X						Methanol[A,B]	ug/L
X						X						pH[A]	pH units
X						X						TDS[A]	mg/L
X						X						DIPE[A,B]	ug/L

Notes

A. Monitor wells to be sampled: MW-3, MW-9 thru MW-14.

B. The following parameters will be eliminated from the sampling program if they are nondetect after the first sampling event.

932910114

TABLE 22

NEWARK TERMINAL

PROPOSED GROUND WATER SAMPLING SCHEDULE
DURING REMEDIAL ACTIVITIES

Months												Analysis	Units
1	2	3	4	5	6	7	8	9	10	11	12		
X			X			X			X			Elevation of top of well casing with cap off (as specified in well well completion report) (all wells on site).	feet MSL: to nearest.01
X			X			X			X			Elevation of original ground level (as specified in well completion report) (all wells on site).	feet MSL: to nearest.01
X			X			X			X			Depth to water table from top of casing prior to sampling with cap off (all wells on site).	feet: to nearest.01
X			X			X			X			Depth to water table from original ground level prior to sampling (all wells on site).	feet: to nearest.01
X			X			X			X			Total petroleum hydrocarbons	mg/L
X												Base/neutrals[A]	ug/L
X			X			X			X			Volatile Organics[A]	ug/L
X												Priority Pollutant Metals[A]	ug/L

Note

A. Monitor wells to be sampled: MW-3, MW-9 thru MW-14.

932910115

TABLE 23

NEWARK TERMINAL

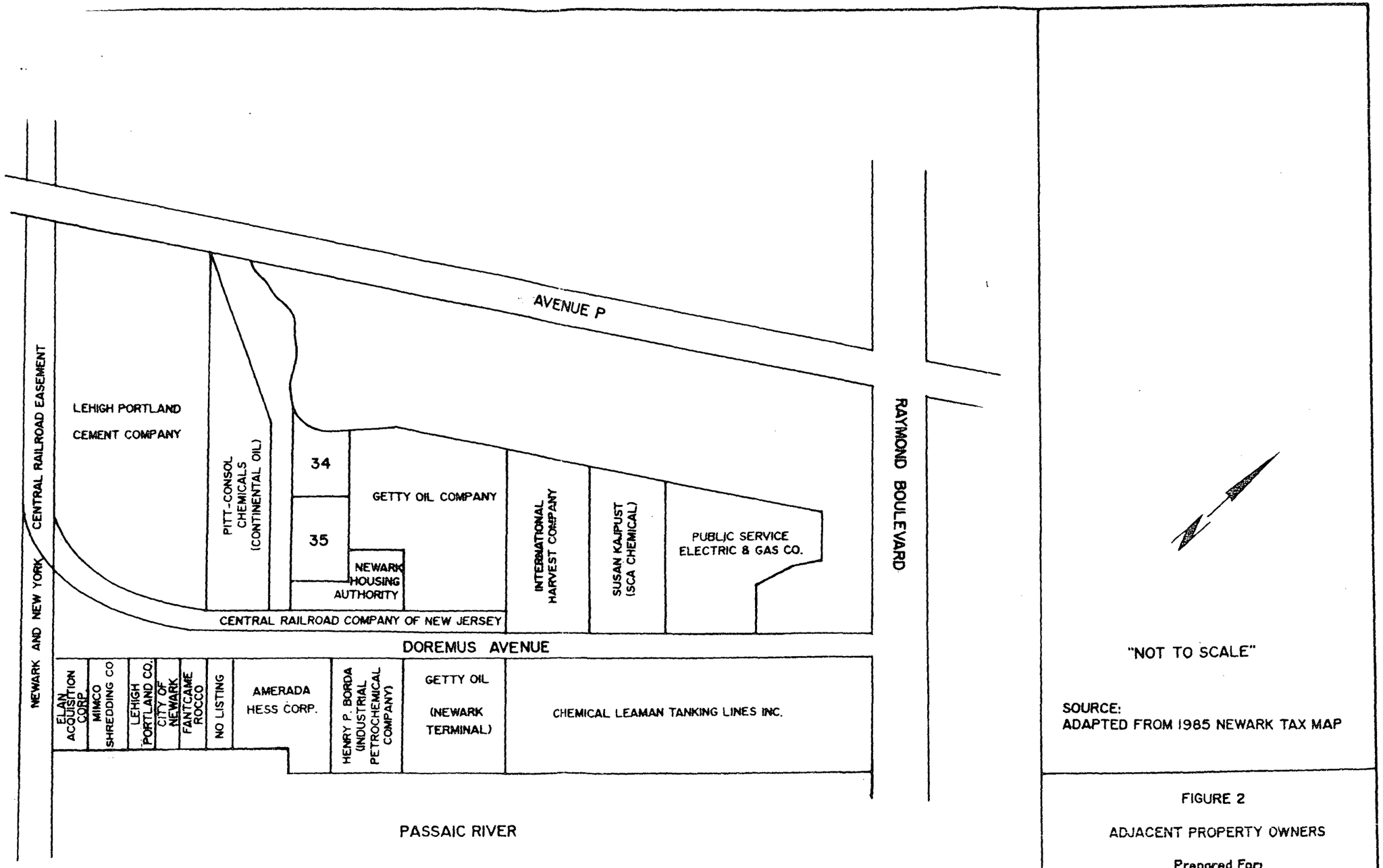
TREATMENT MONITORING SCHEDULE

System	Monitoring Parameter	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
Soil Venting	• Air Monitoring (weekly)	X	X	X	X	X	X	X	X	X	X	X	X
	• Soil Samples (5)												
	- TPHC	X					X						
	- Volatile Organics	X					X						
Insitu Biodegradation	• 1 composite soil sample for Area A												
	- TPHC					X	X	X	X	X			
	- volatile organics					X	X	X	X	X			
Ground Water													
	• Ground Water Contour Map	X			X			X			X		
	• Analyses (see Tables 21 and 22)	X			X			X			X		

932910116

Figures

DRAWN BY	CHECKED BY	DRAWING NUMBER
JORDAN 9-22-89	APPROVED BY	528356



"NOT TO SCALE"

SOURCE:
ADAPTED FROM 1985 NEWARK TAX MAP

FIGURE 2

ADJACENT PROPERTY OWNERS

Prepared For:
TEXACO REFINING AND MARKETING INC.
NEWARK TERMINAL
PROJECT No. 528356
SEPTEMBER 1989

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932910118

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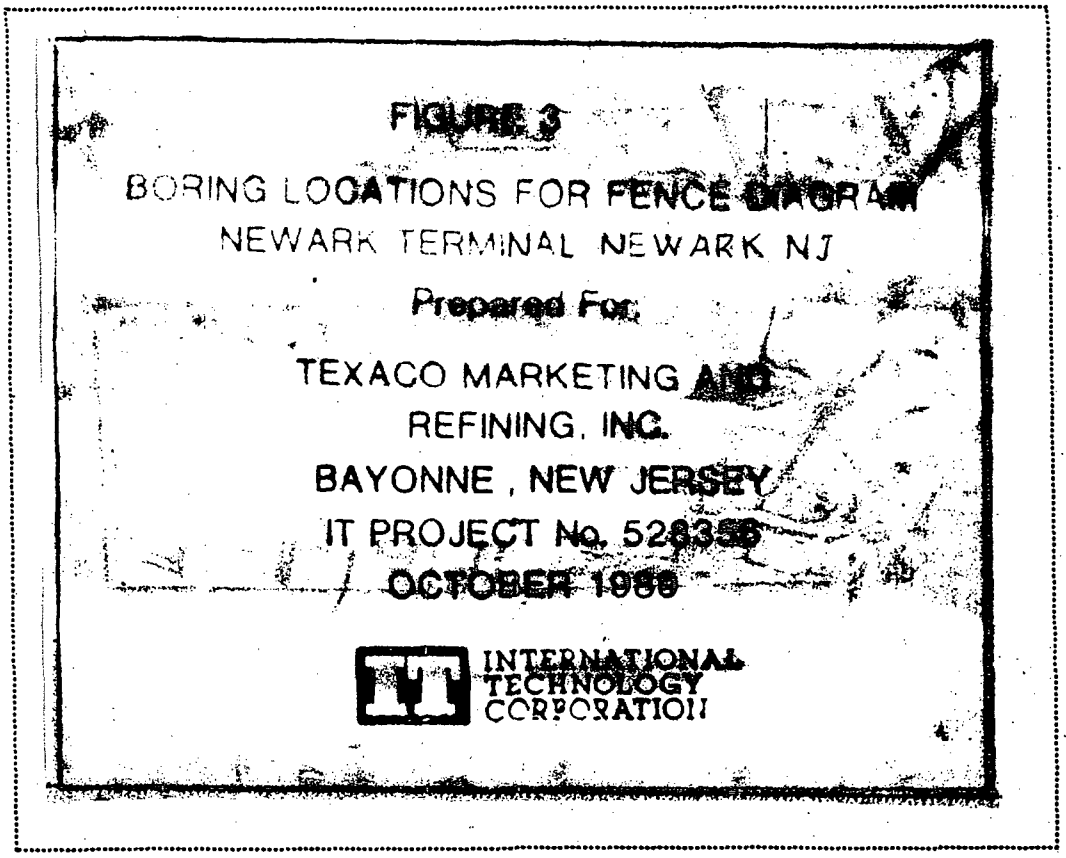

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FIGURE 4

GEOLOGIC FENCE DIAGRAM

NEWARK TERMINAL, NEWARK, NJ

Prepared For:

TEXACO MARKETING AND REFINING, INC.

BAYONNE , NEW JERSEY

IT PROJECT No. 528356

OCTOBER 1989

INTERNATIONAL TECHNOLOGY CORPORATION

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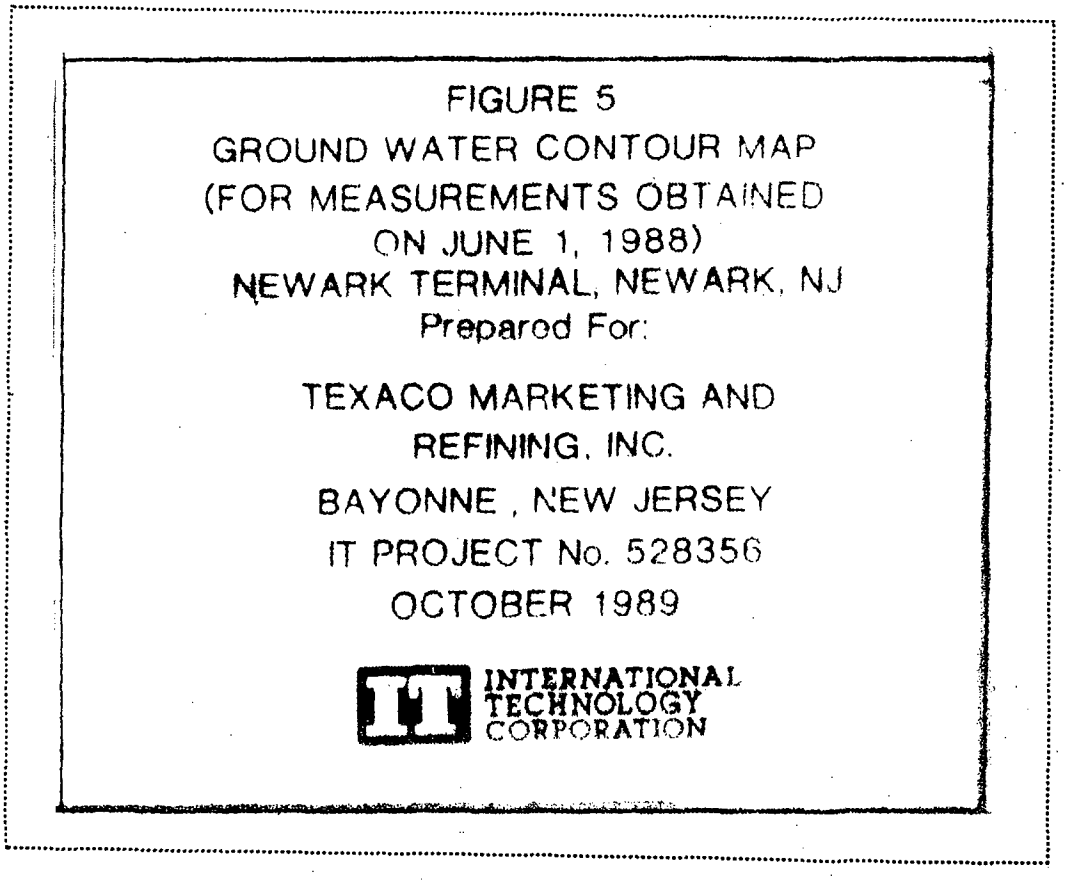

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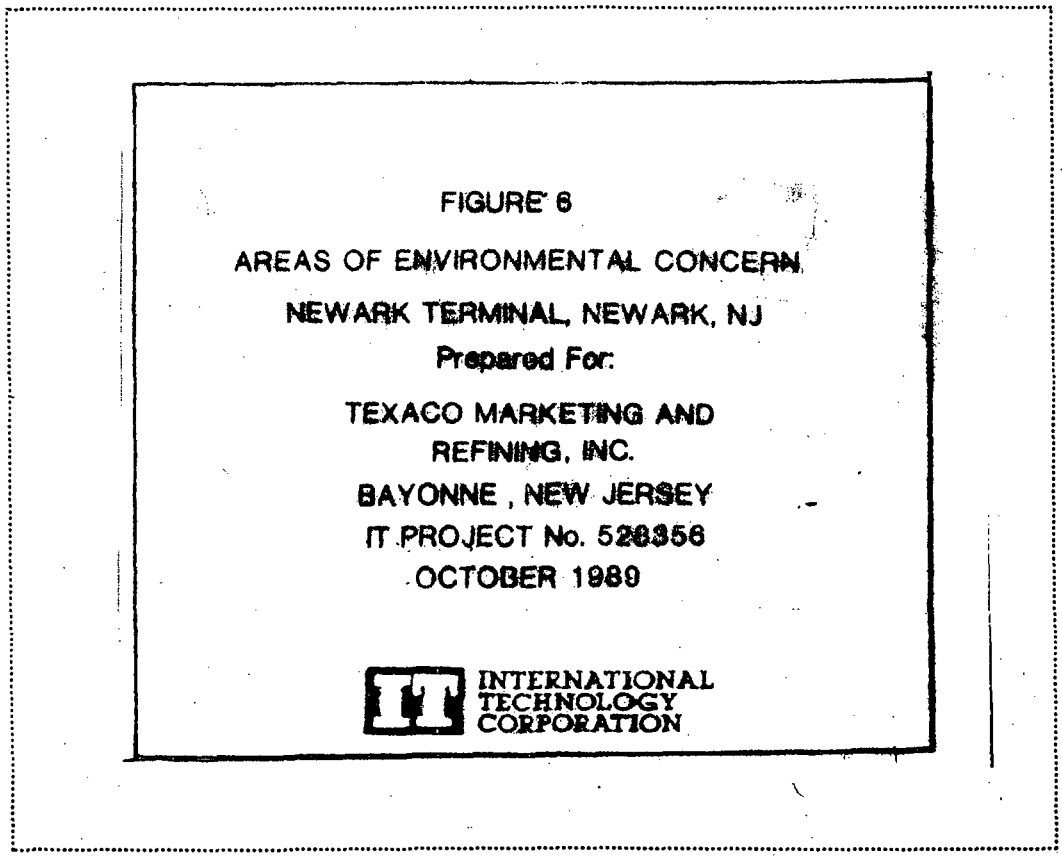

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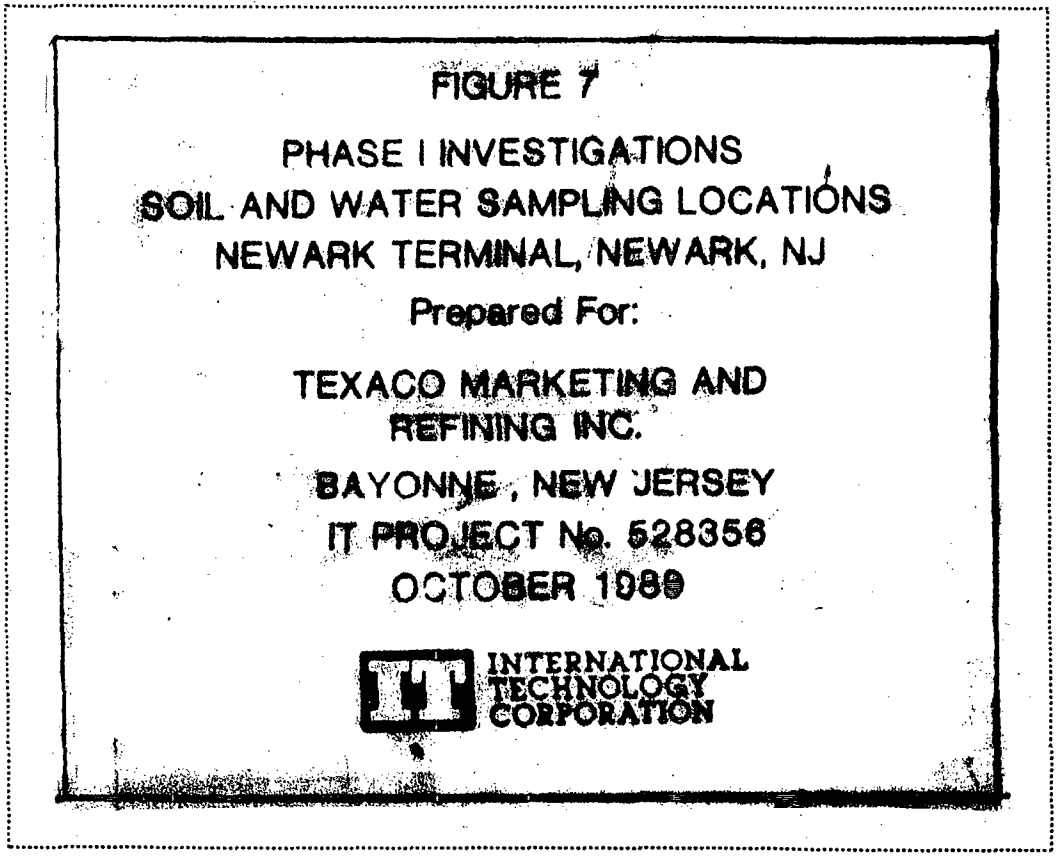

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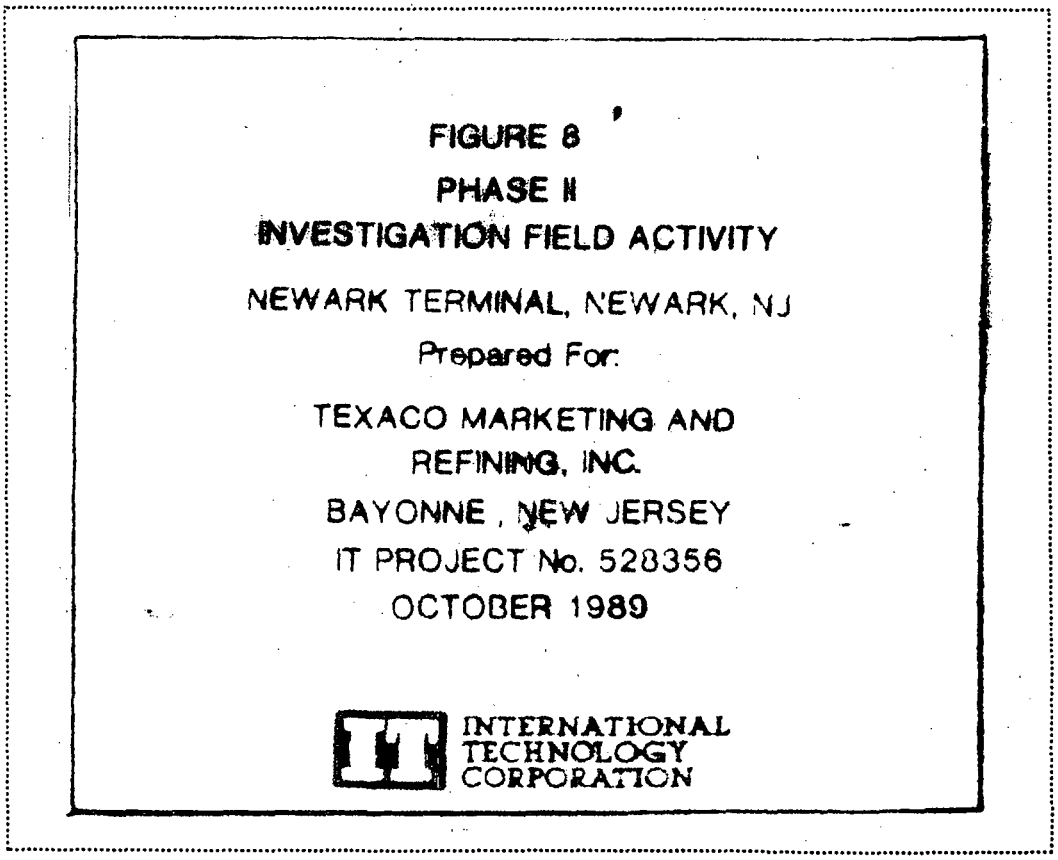

932910124

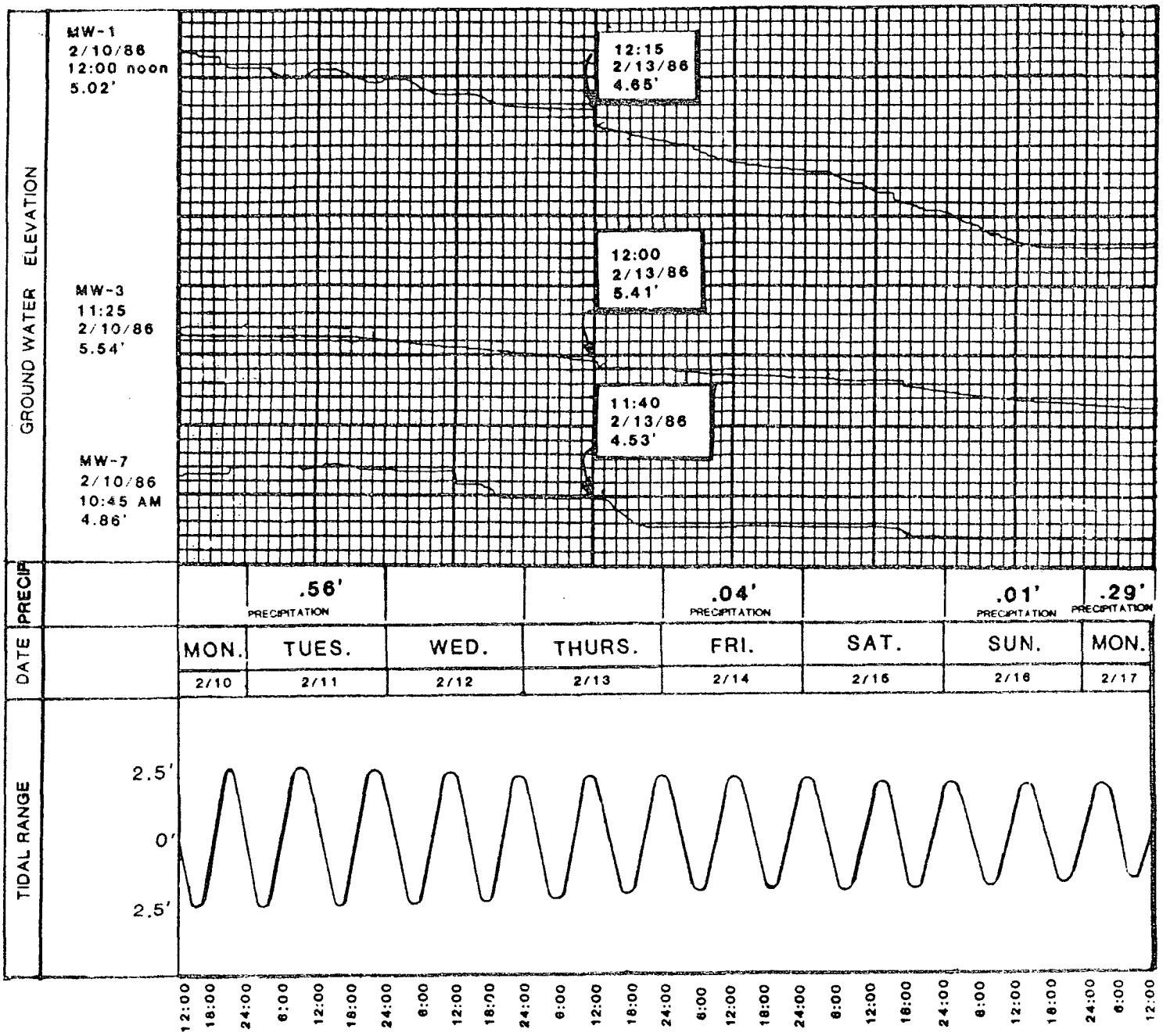

FIGURE 9

TIDAL INFLUENCE ON GROUND WATER
NEWARK TERMINAL, NEWARK, NJ

Prepared For:

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BAYONNE, NEW JERSEY
IT PROJECT No. 528356
OCTOBER 1989

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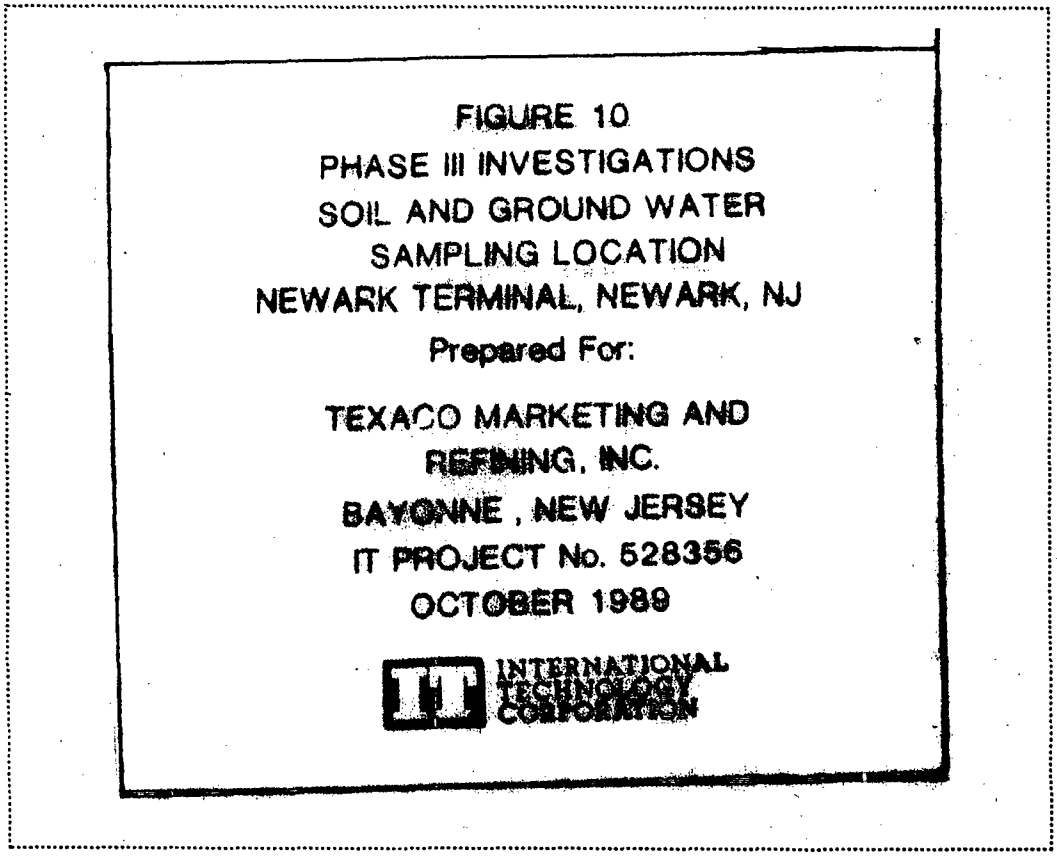

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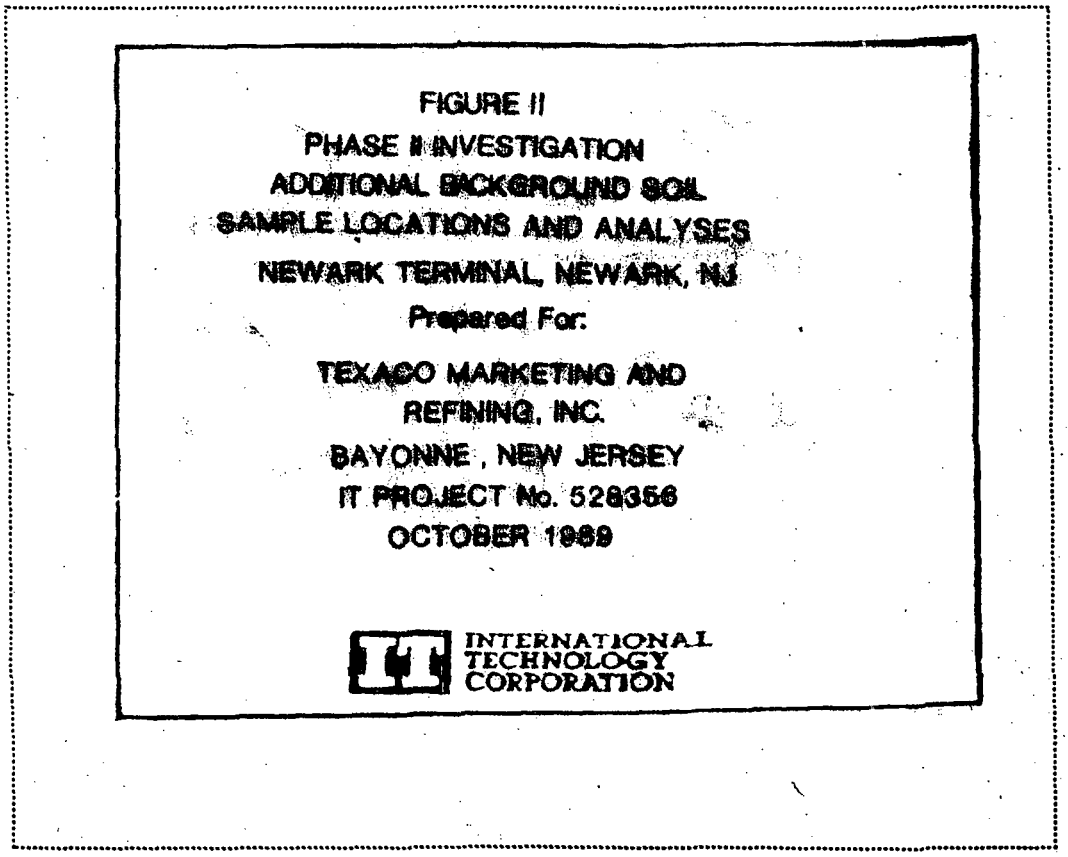

932910127

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FIGURE 12

BIODEGRADATION OF TANK BASIN SOIL
NEWARK TERMINAL, NEWARK, NJ

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IT PROJECT No. 528356
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FIGURE 13

REMEDIAL ACTIVITIES

NEWARK TERMINAL, NEWARK, NJ

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BAYONNE, NEW JERSEY
IT PROJECT No. 528356
OCTOBER 1989

INTERNATIONAL TECHNOLOGY CORPORATION

932910129

DRAWN BY	JKM	CHECKED BY	
	9-29-89	APPROVED BY	

DRAWING NUMBER 528356

B-101
SOIL VENT BLOWER
200 CFM

V-101A
CARBON ADSORBER
55 GALLON DRUM

V-101B
CARBON ADSORBER
55 GALLON DRUM

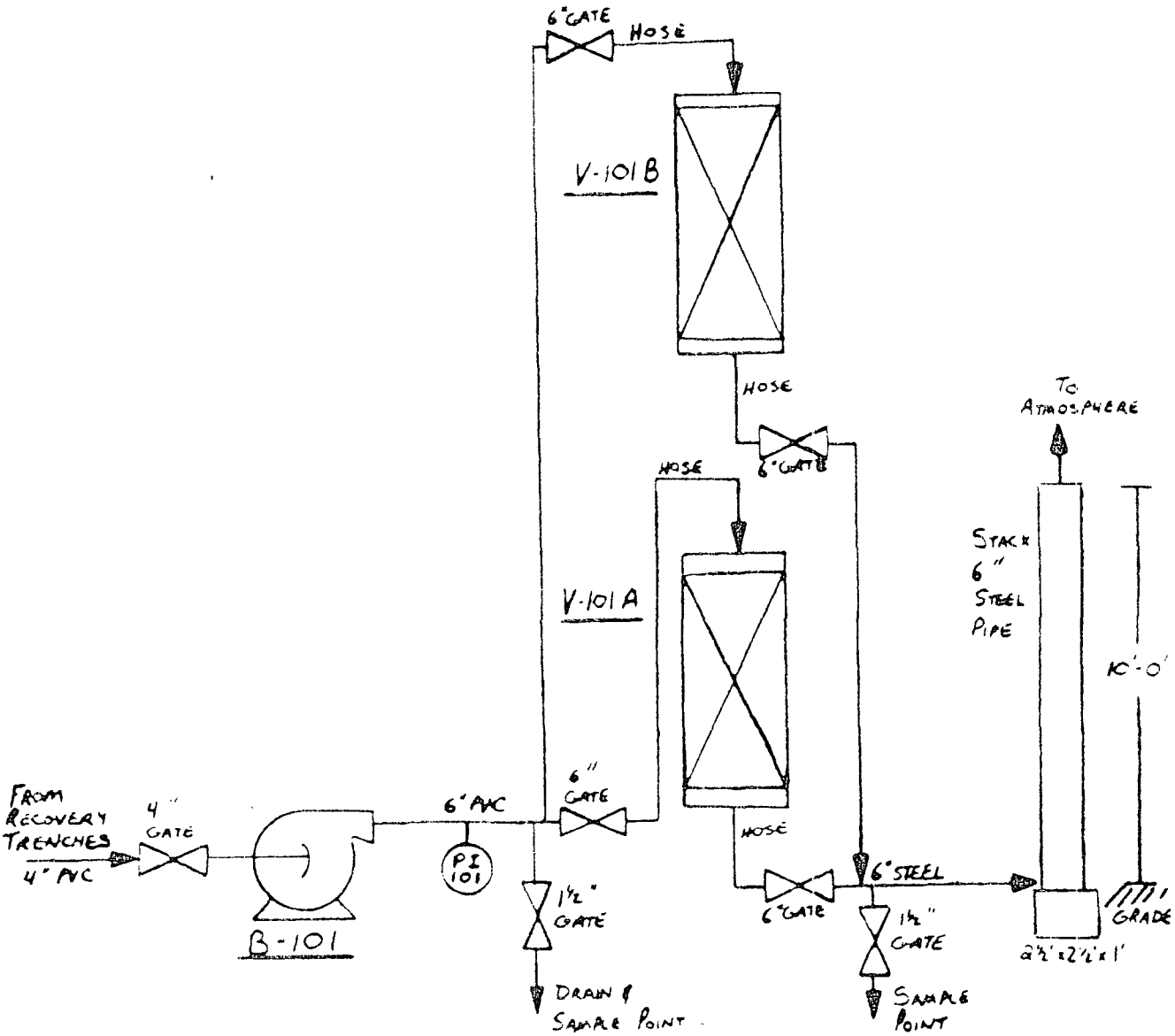

FIGURE 14

SOIL VENTING EFFLUENT TREATMENT
NEWARK TERMINAL, NEWARK, NJ

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BAYONNE, NEW JERSEY
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OCTOBER 1989

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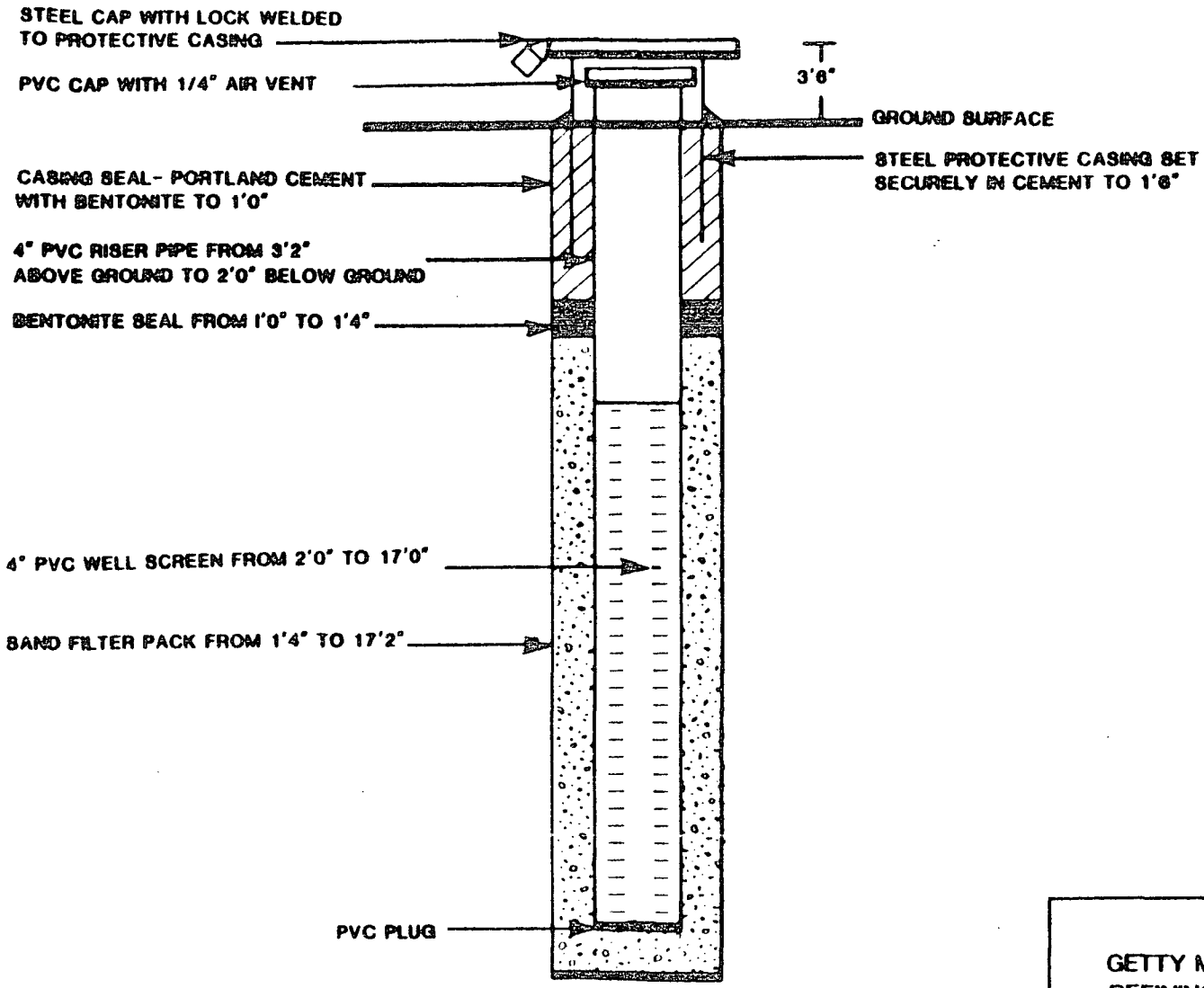
Do Not Scale This Drawing

932910130

Appendix A

APPENDIX A

932910132



F-1

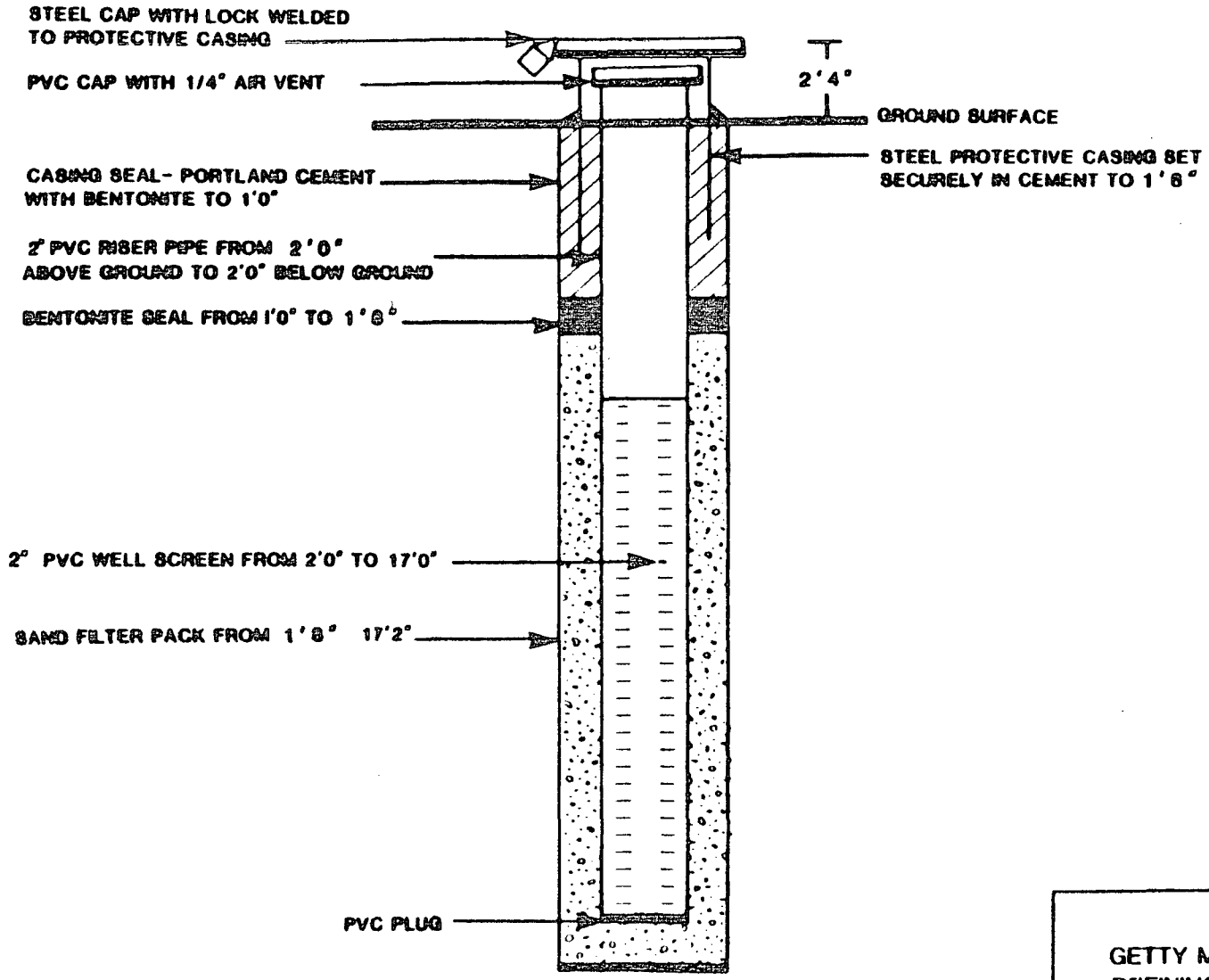
GETTY MARKETING & REFINING COMPANY

WELL CONSTRUCTION DIAGRAM FOR MW-01

DECEMBER 1984

pas

932910133



GETTY MARKETING & REFINING COMPANY

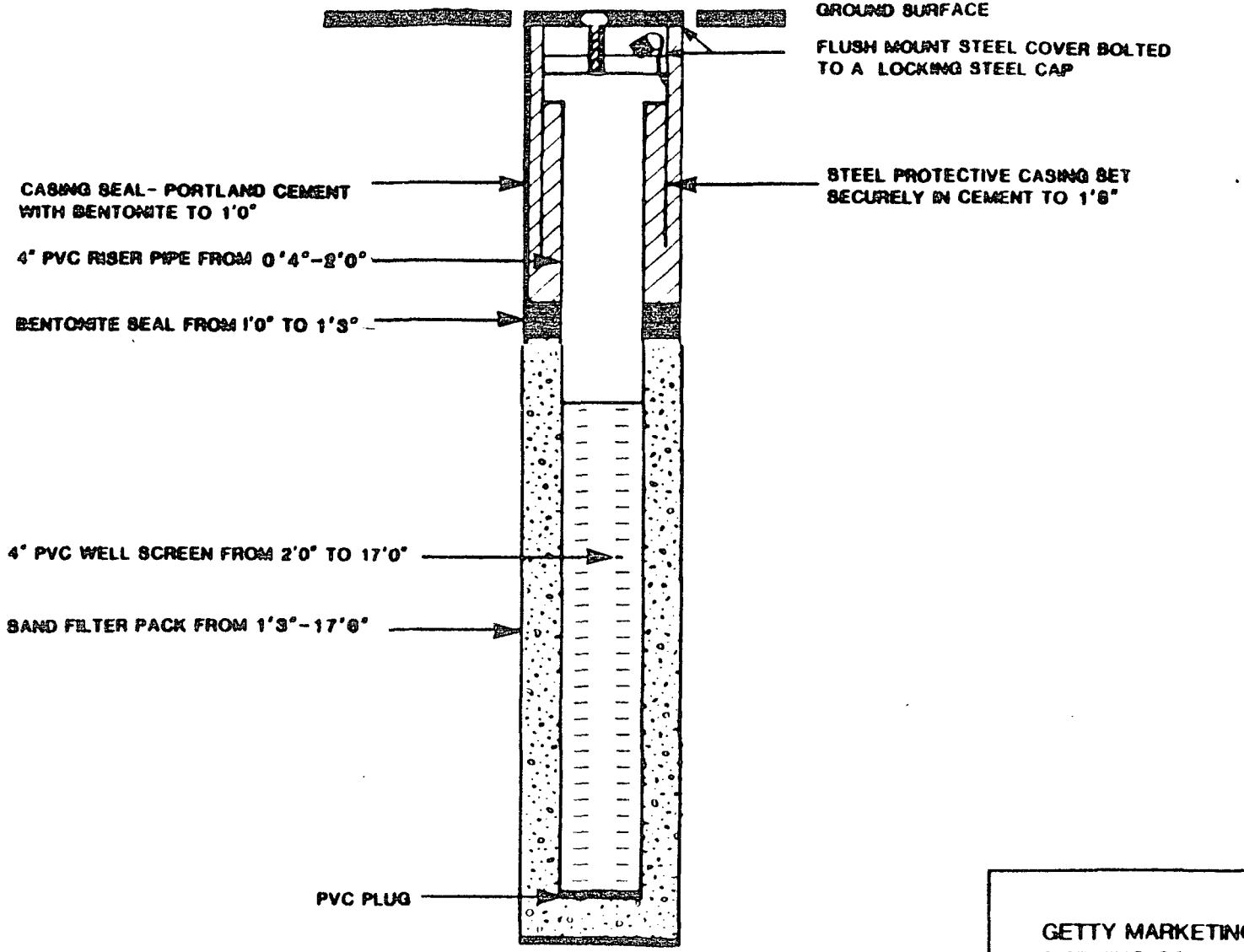
WELL CONSTRUCTION DIAGRAM FOR MW-02

DECEMBER 1984

pas

F-2

932910134



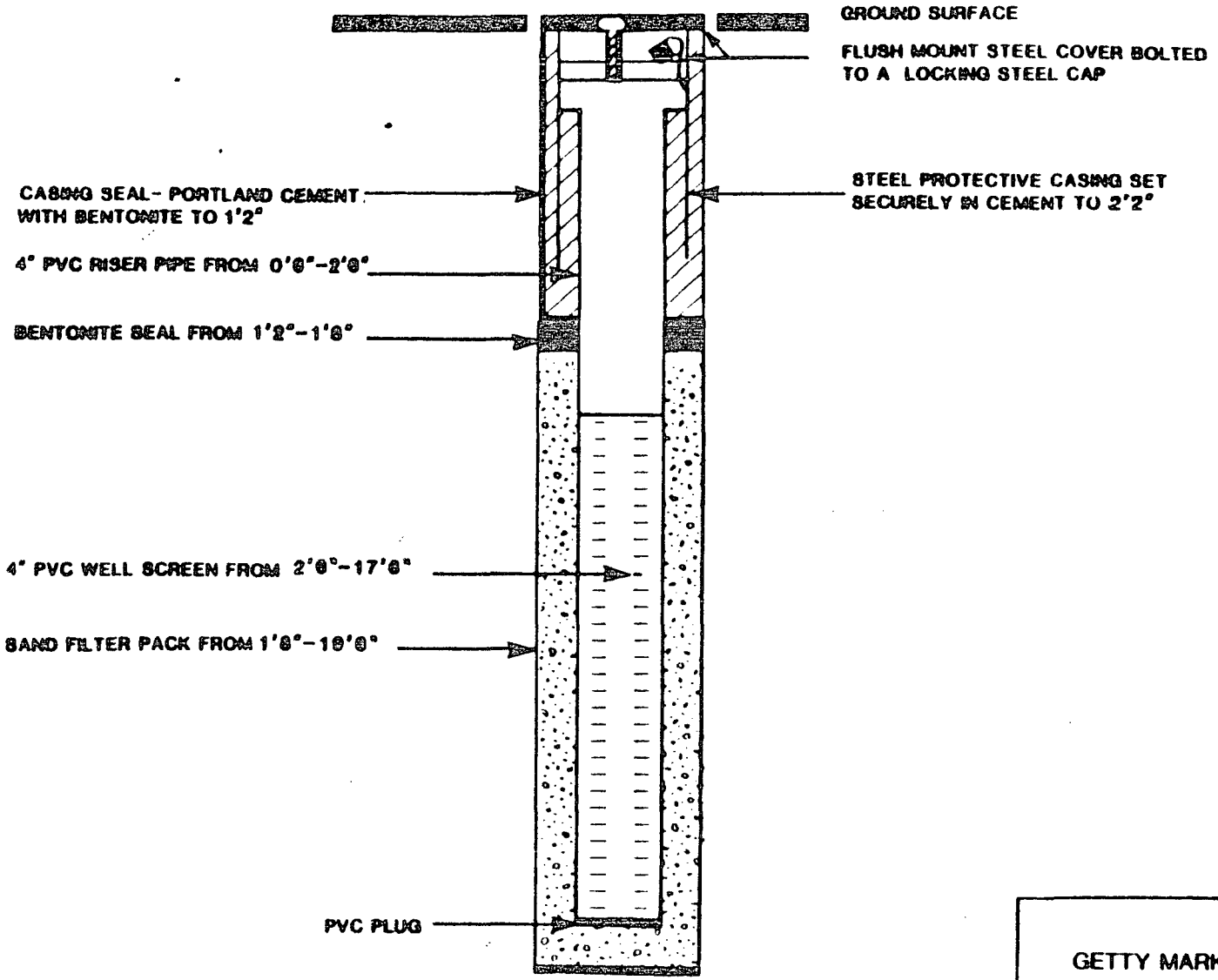
GETTY MARKETING &
REFINING COMPANY

WELL CONSTRUCTION DIAGRAM
FOR MW-03

DECEMBER 1984

pas

932910135



GETTY MARKETING & REFINING COMPANY

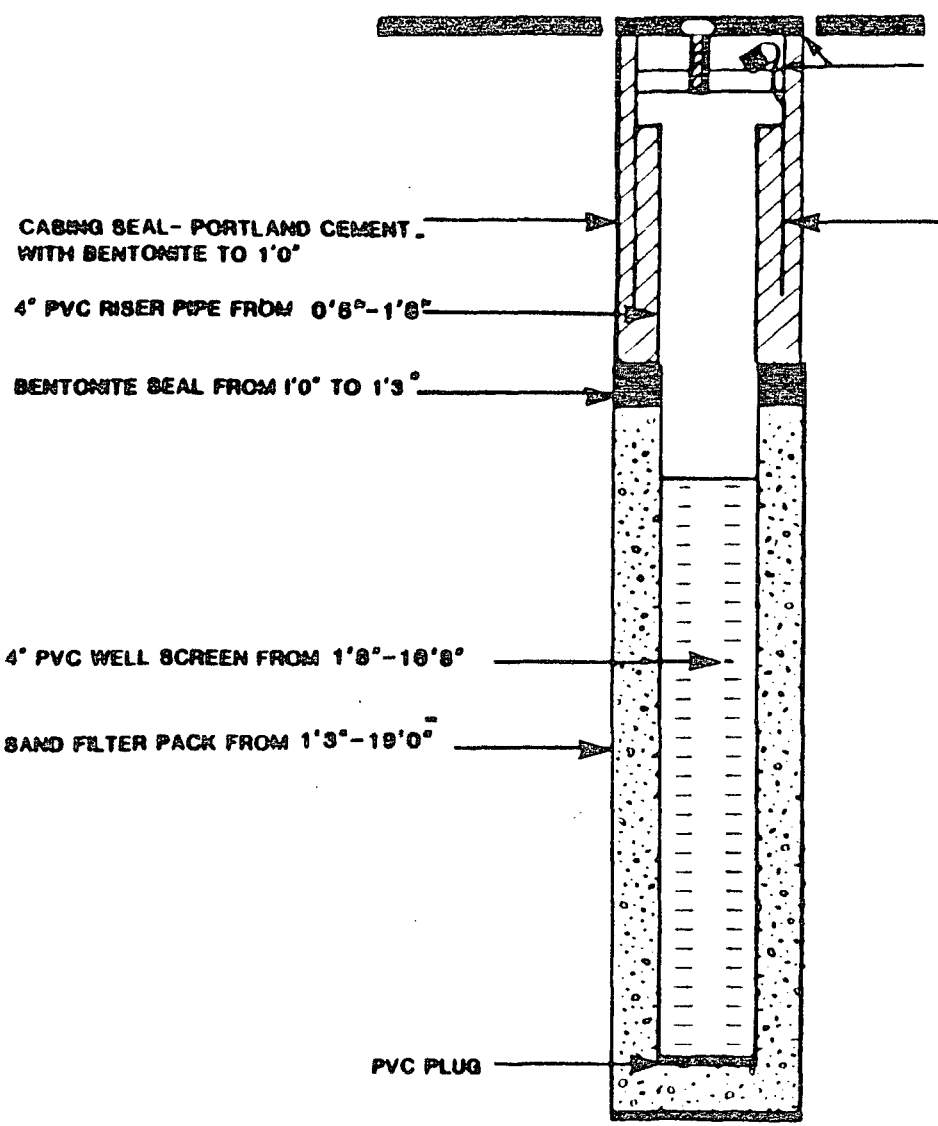
WELL CONSTRUCTION DIAGRAM FOR MW-04

DECEMBER 1984

pas

F-4

932910136



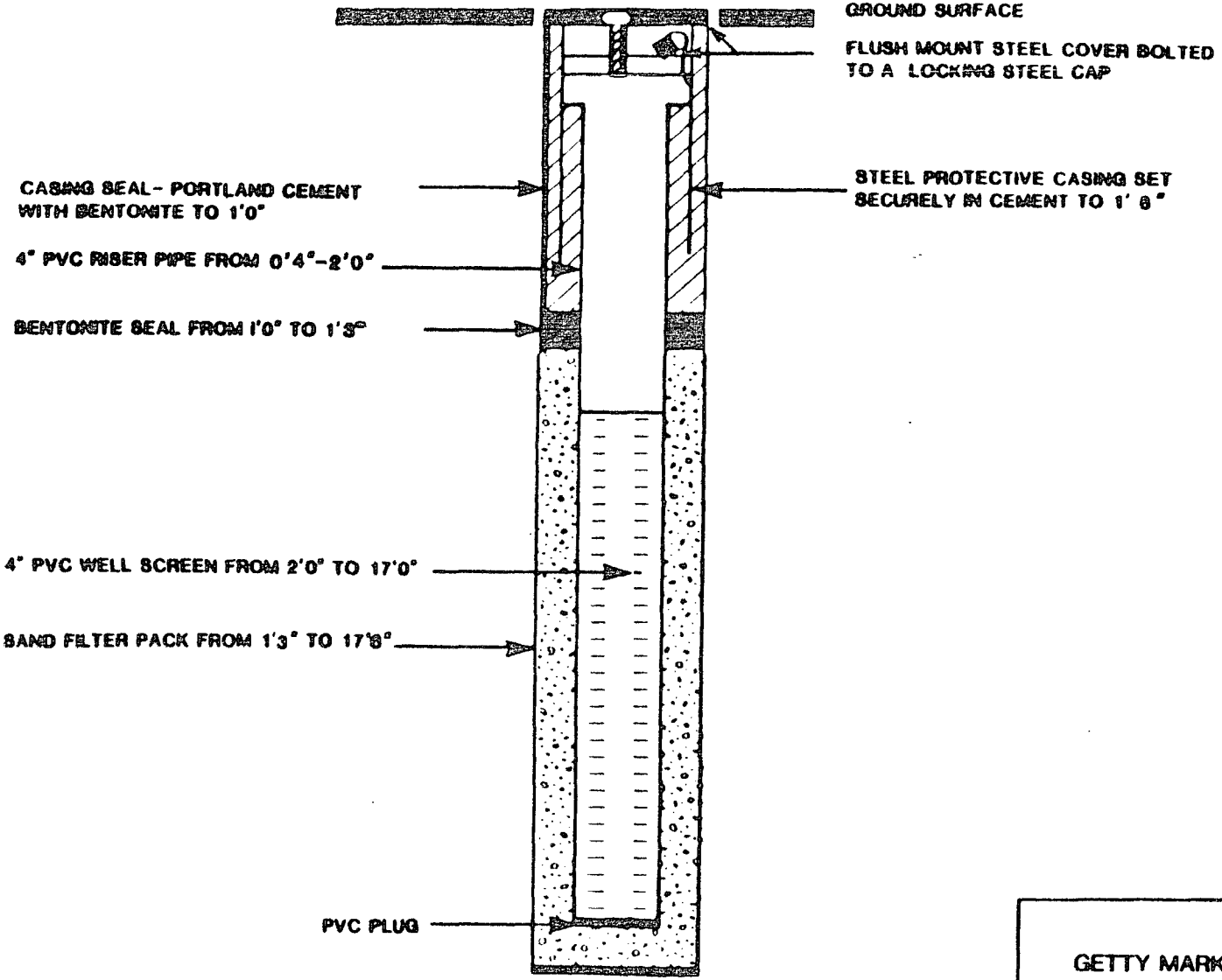
GETTY MARKETING & REFINING COMPANY

WELL CONSTRUCTION DIAGRAM FOR MW-05

DECEMBER 1984

pas

F-5



GETTY MARKETING & REFINING COMPANY

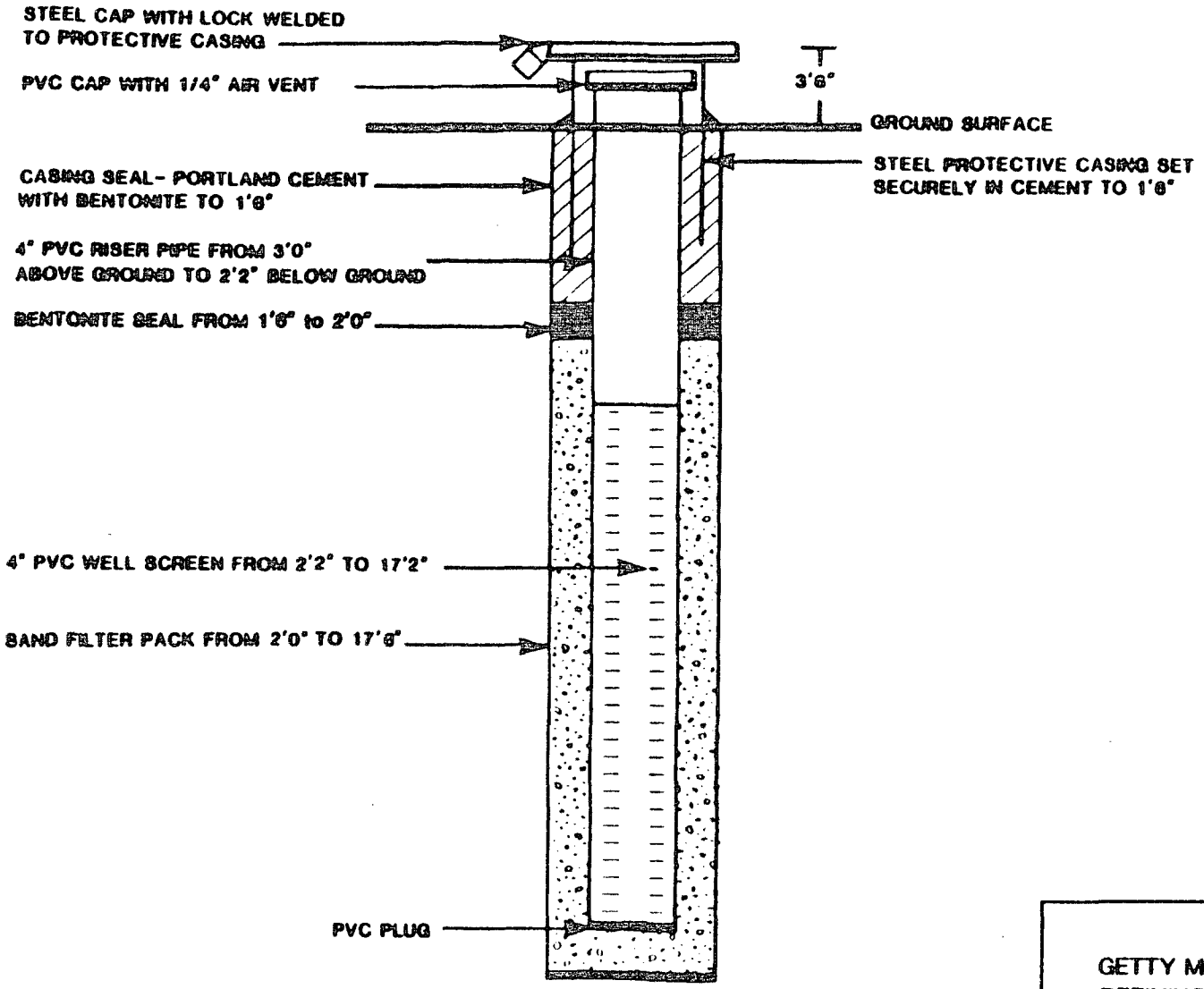
WELL CONSTRUCTION DIAGRAM FOR MW-06

DECEMBER 1984

pas

F-6

932910138



GETTY MARKETING & REFINING COMPANY

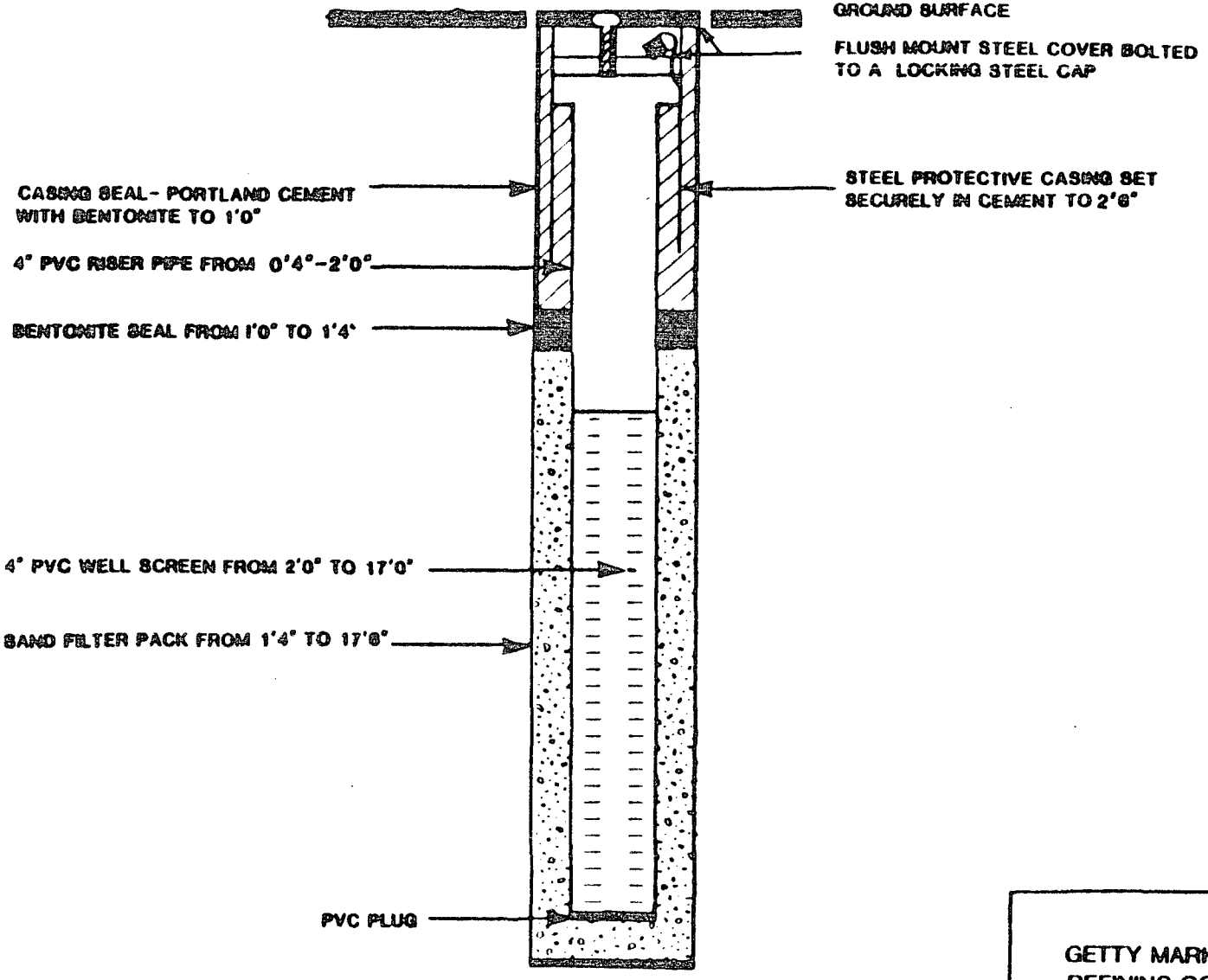
WELL CONSTRUCTION DIAGRAM FOR MW-07

DECEMBER 1984

pas

F-7

932910139



GETTY MARKETING & REFINING COMPANY

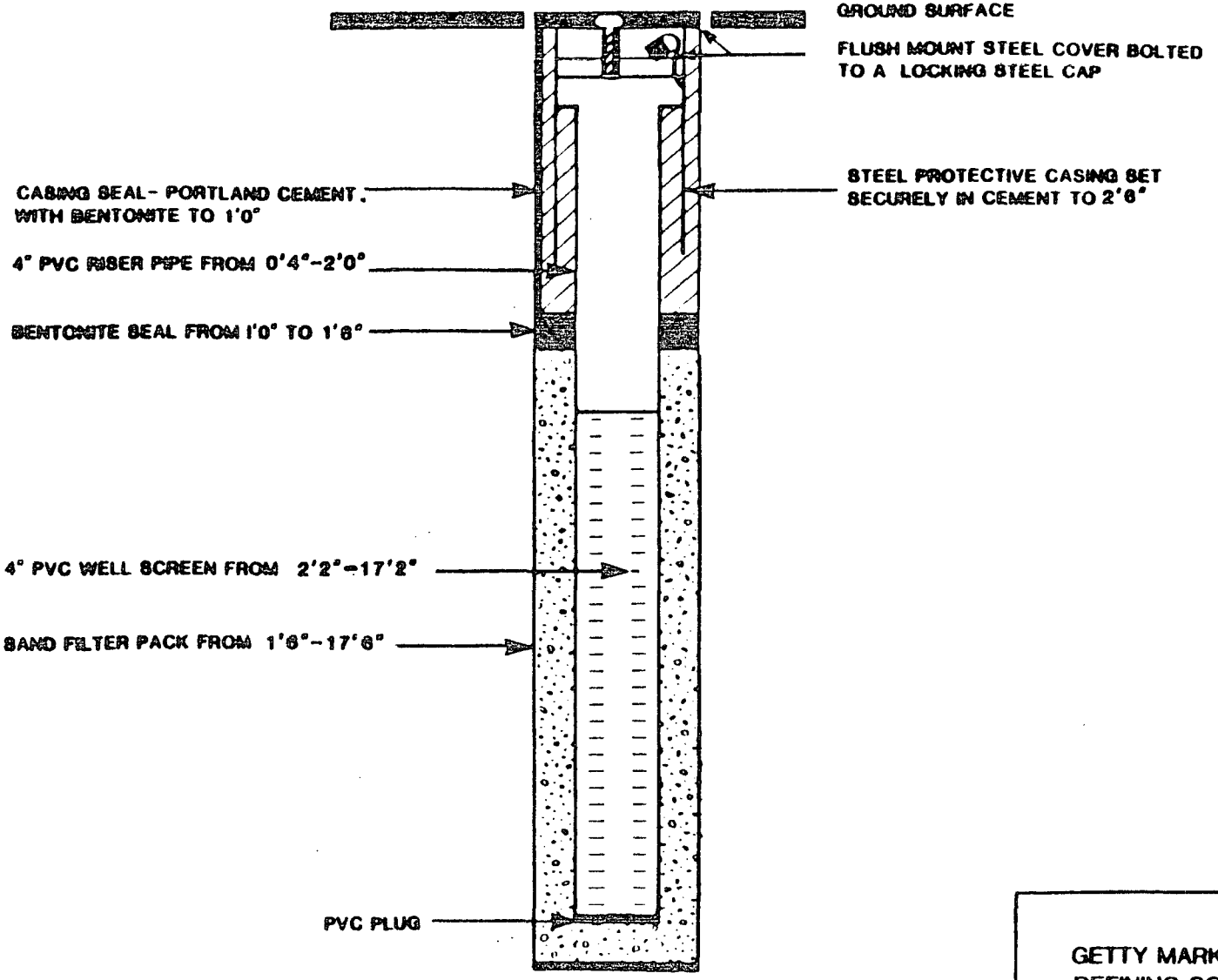
WELL CONSTRUCTION DIAGRAM FOR MW-0 8

DECEMBER 1984

pas

F-8

932910140



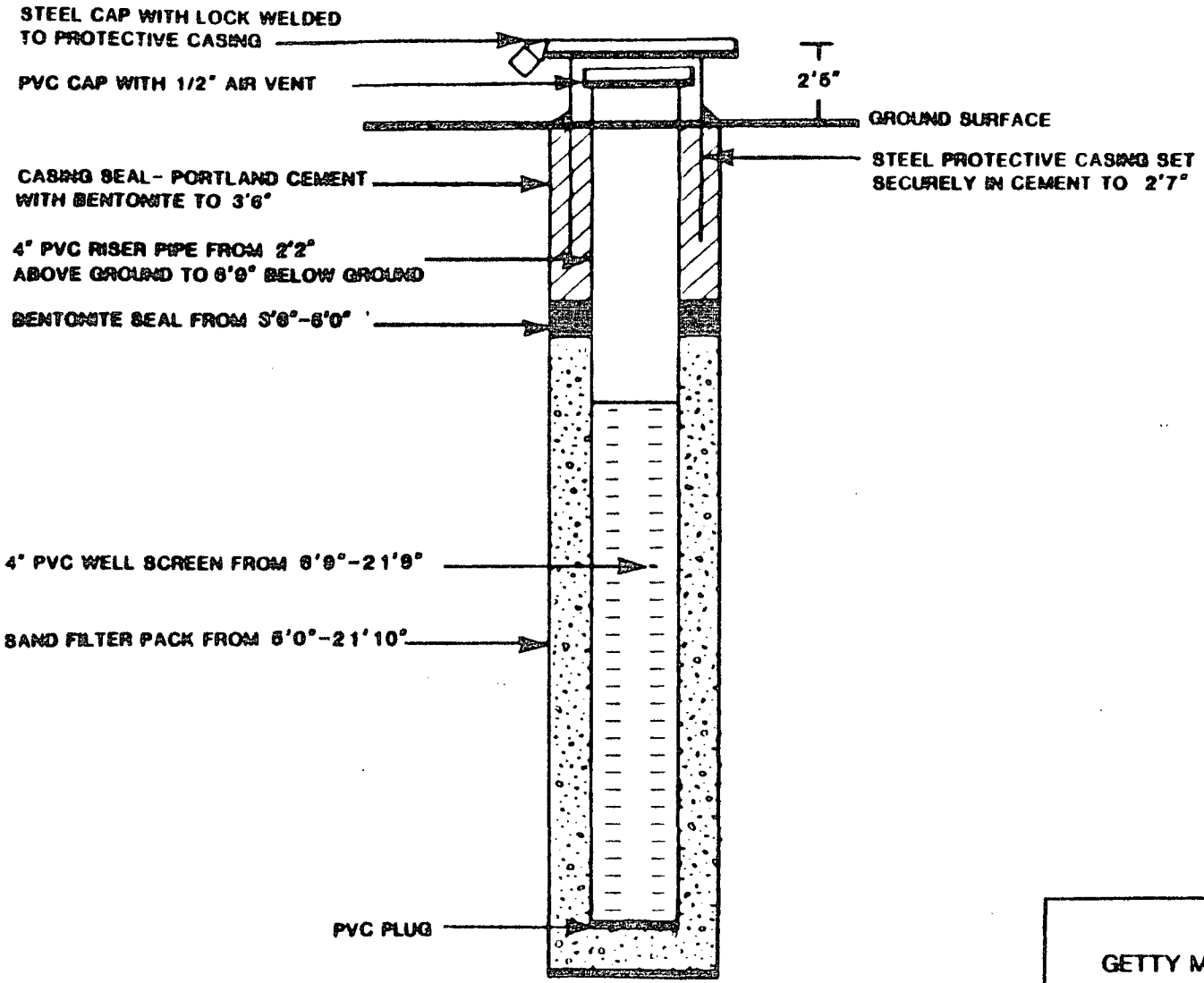
GETTY MARKETING & REFINING COMPANY

WELL CONSTRUCTION DIAGRAM FOR MW-09

DECEMBER 1984

pas

932910141



GETTY MARKETING & REFINING COMPANY

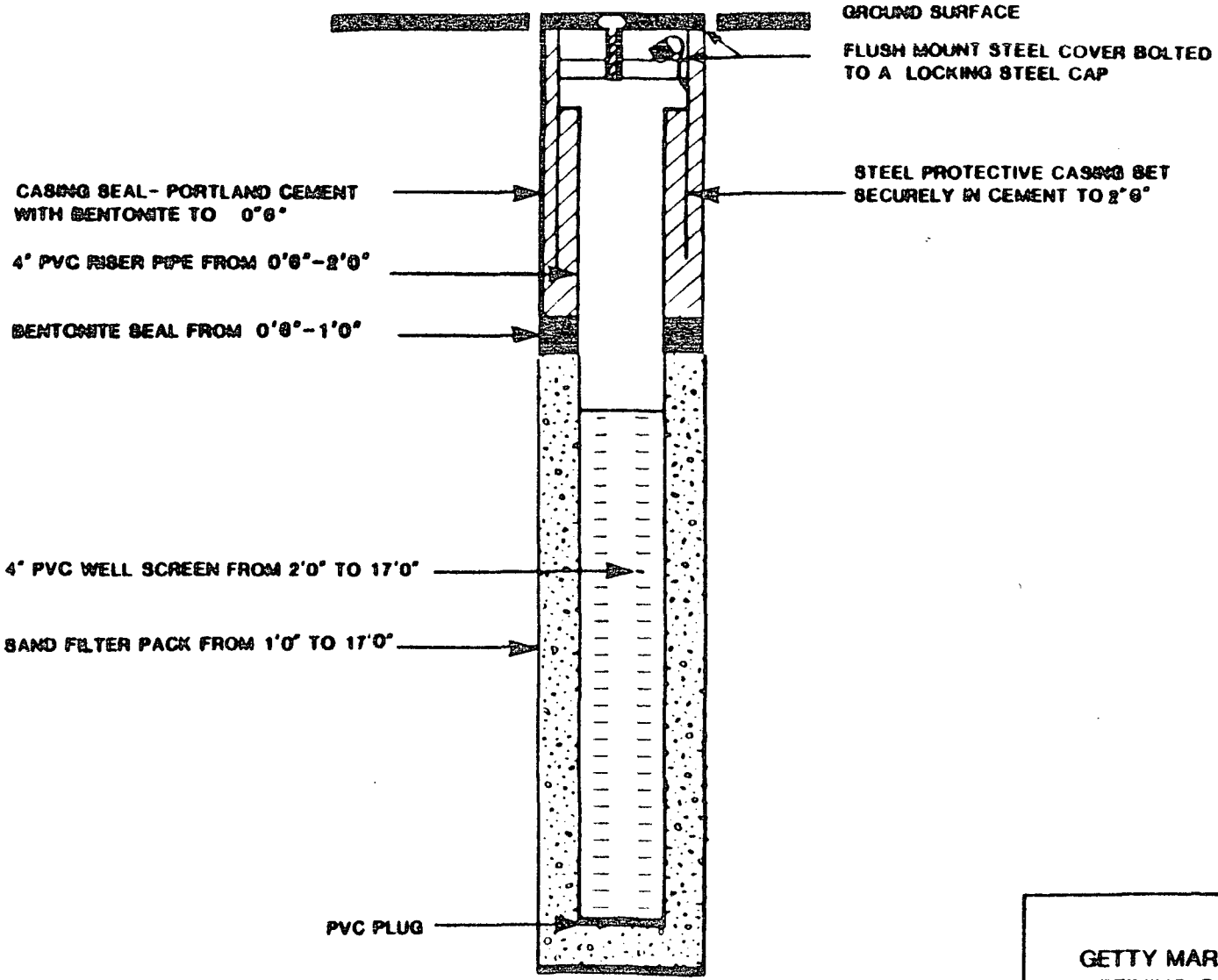
WELL CONSTRUCTION DIAGRAM FOR MW-10

DECEMBER 1984

pas

F-10

932910142



GETTY MARKETING & REFINING COMPANY

WELL CONSTRUCTION DIAGRAM FOR MW-11

DECEMBER 1984

pas

932910143

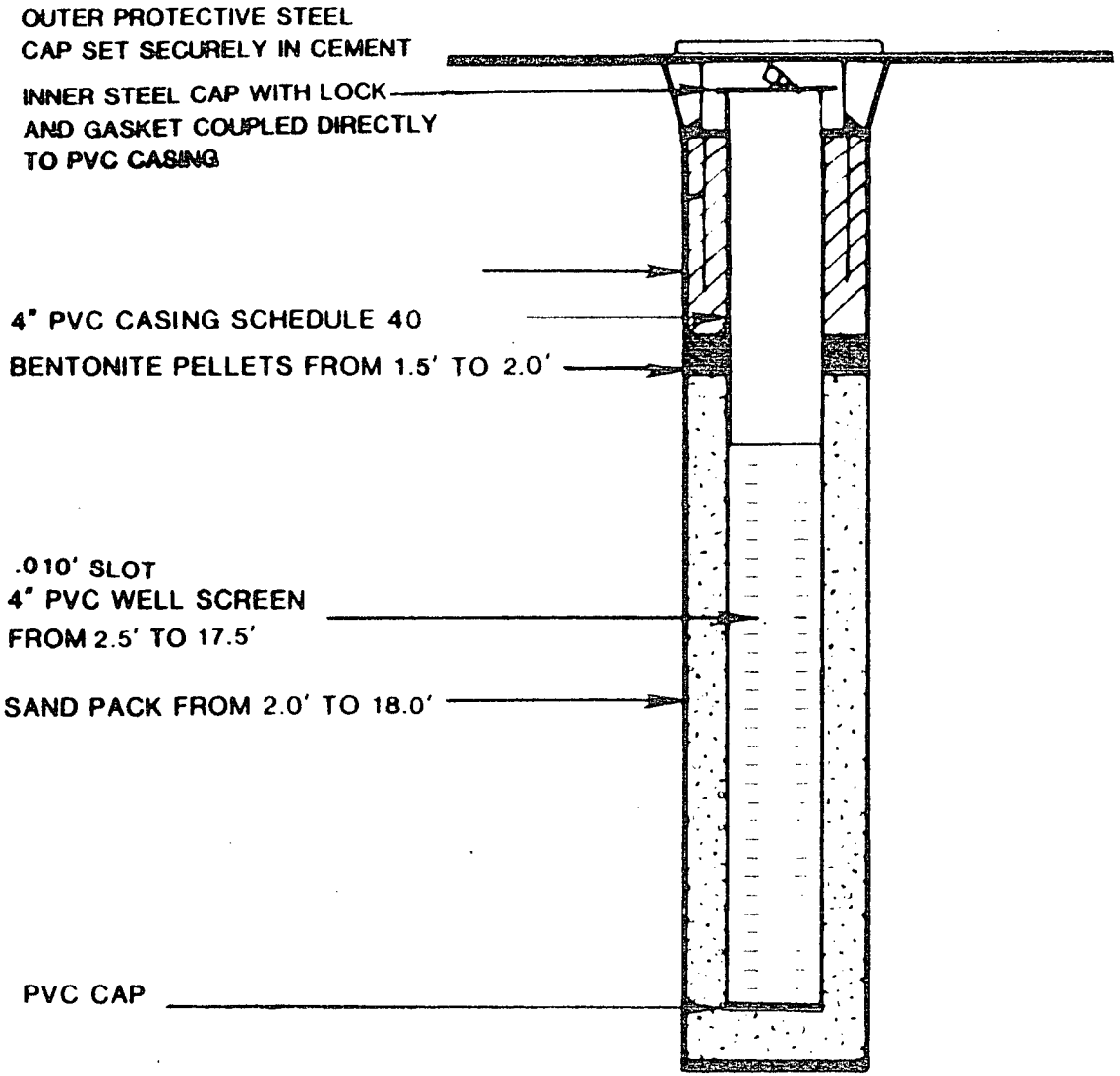
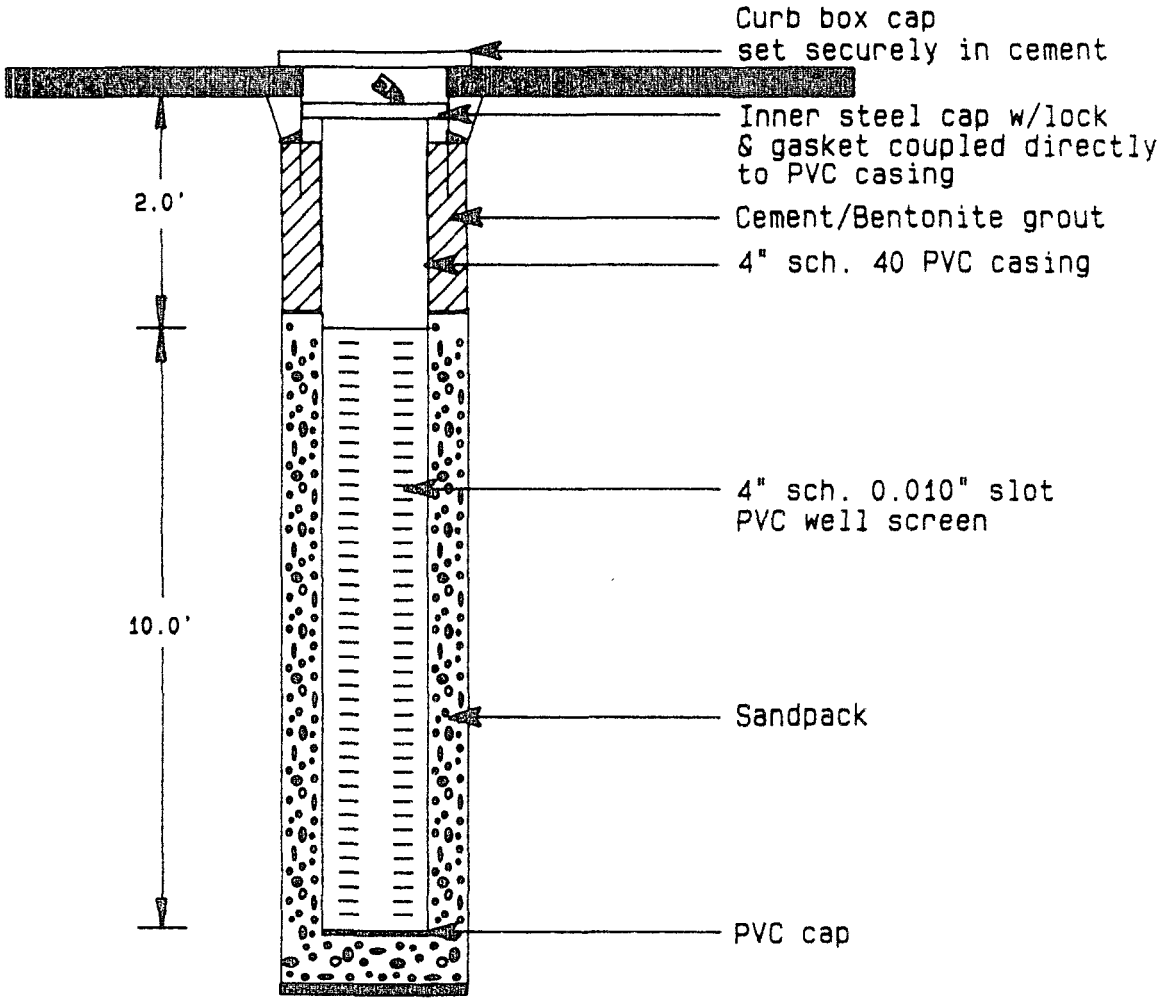


FIGURE
WELL CONSTRUCTION DIAGRAM
FOR WELLS MW-12 & MW-13
TEXACO USA
NEWARK TERMINAL
JANUARY 1986

932910144

DRAWING NUMBER	c--JMR\ 52835614
CHECKED BY	
APPROVED BY	
June Rallyhyers	
DRAWN BY	



MW-14

Prepared for:

TEXACO, INC.
Newark, NJ

PROJECT No. 528356

OCTOBER 1989

"NOT TO SCALE"

INTERNATIONAL TECHNOLOGY CORPORATION

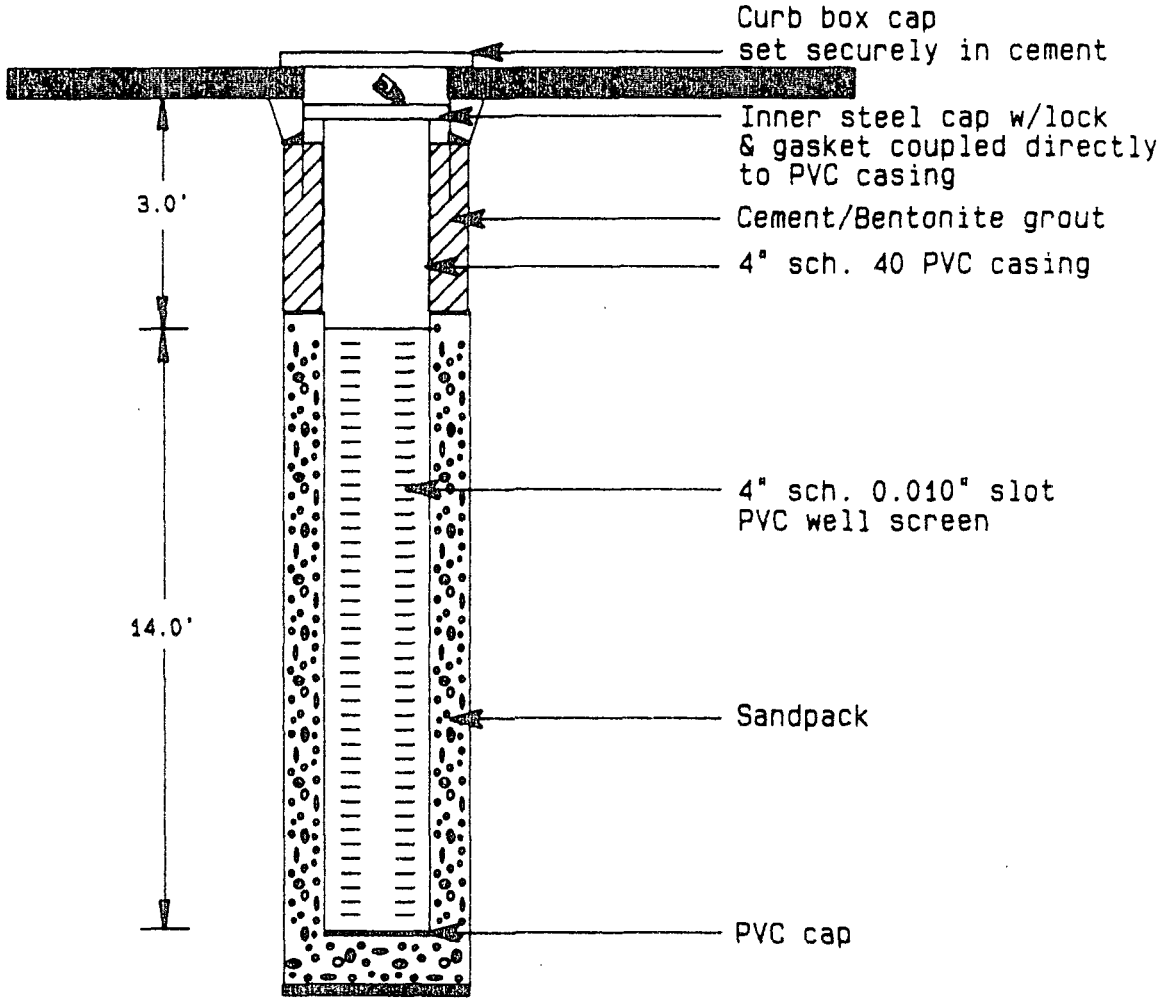
1989 IT CORPORATION
ALL COPYRIGHTS RESERVED

DRAWING NUMBER 528356 15 c-JMR

CHECKED BY
APPROVED BY

June Reillyhyers

DRAWN BY



MW-15

Prepared for:

TEXACO, INC.
Newark, NJ

PROJECT No. 528356

OCTOBER 1989

"NOT TO SCALE"

INTERNATIONAL TECHNOLOGY CORPORATION

1989 IT CORPORATION
ALL COPYRIGHTS RESERVED

932910146

Appendix B

APPENDIX B

The following monitor well certification forms have been completed for information purposes only. They are not intended to certify the construction of each well, as these forms were not required at the time of construction.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ NA

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-964-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 5 4 -
Owner's Well Number (As shown on the application or plans):	MW-01
Well Completion Date:	11/29/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	3.20'
Total Depth of Well (one-tenth of a foot):	17.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	5.2'
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	4.02
Yield (Gallons per Minute):	5.0
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910149

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 7 2 5 4 - -
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 8.99
Owners Well Number (As shown on the application or plans): MW-01

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910150

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 5 5 -
Owner's Well Number (As shown on the application or plans):	MW-02
Well Completion Date:	12/6/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	2.00
Total Depth of Well (one-tenth of a foot):	17.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	2.0
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	2.35
Yield (Gallons per Minute):	1.0
Length of time Well Pumped or Bailed:	0 Hours 8 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910151

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 7 2 5 5 - _
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 8.40
Owners Well Number (As shown on the application or plans): MW-02

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910152

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 5 6 -
Owner's Well Number (As shown on the application or plans):	MW-03
Well Completion Date:	11/29/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	-0.33 (flushmount)
Total Depth of Well (one-tenth of a foot):	17.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	1.7
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	1.53
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910153

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 26-7256-
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 7.22
Owners Well Number (As shown on the application or plans): MW-03

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910154

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: TEXACO, INC.
Name of Facility: FORMER GETTY MARKETING AND REFINING CO.
Location: NEWARK, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-72577
Owner's Well Number (As shown on the application or plans):	MW-04
Well Completion Date:	11/28/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	-0.50 (FLUSH MOUNT)
Total Depth of Well (one-tenth of a foot):	17.5
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	2.5
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	1.37
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediate responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

DANA BOYADJIAN
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910155

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): This number must be permanently affixed to the well casing. 2 6-7 2 5 7 -

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 6.72
Owners Well Number (As shown on the application or plans): MW-04

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910156

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 5 8 -
Owner's Well Number (As shown on the application or plans):	MW-05
Well Completion Date:	11/27/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	-0.40 (flushmount)
Total Depth of Well (one-tenth of a foot):	16.7
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	1.3
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	1.00
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910157

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 7 2 5 8 - _
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 6.93
Owners Well Number (As shown on the application or plans): MW-05

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910158

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 5 9 -
Owner's Well Number (As shown on the application or plans):	MW-06
Well Completion Date:	11/29/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	-0.33 (flushmount)
Total Depth of Well (one-tenth of a foot):	17.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	1.7
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	0.60
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 7 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910159

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): This number must be permanently affixed to the well casing. 2 6 - 7 2 5 9 - _

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 6.29
Owners Well Number (As shown on the application or plans): MW-06

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910160

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 6 0 -
Owner's Well Number (As shown on the application or plans):	MW-07
Well Completion Date:	11/26/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	3.00
Total Depth of Well (one-tenth of a foot):	17.2
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	5.2
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	
Yield (Gallons per Minute):	
Length of time Well Pumped or Bailed:	Hours Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910161

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 7 2 6 0 - _
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 6.31
Owners Well Number (As shown on the application or plans): MW-07

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

932910162

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 6 1 _ - _
Owner's Well Number (As shown on the application or plans):	MW-08
Well Completion Date:	12/2/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	-0.33 (flushmount)
Total Depth of Well (one-tenth of a foot):	17.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	1.7
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	1.67
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910163

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6-7 2 6 1 -
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 6.83
Owners Well Number (As shown on the application or plans): MW-08

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910164

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 6 2 -
Owner's Well Number (As shown on the application or plans):	MW-09
Well Completion Date:	11/30/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	-0.33
Total Depth of Well (one-tenth of a foot):	17.2
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	1.9
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	2.52
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910165

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 7 2 6 2 - _
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 3.37
Owners Well Number (As shown on the application or plans): MW-09

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

PROFESSIONAL LAND SURVEYOR'S NAME (Please print or type)

SEAL

PROFESSIONAL LAND SURVEYOR'S LICENSE #

932910166

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-964-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 6 3 -
Owner's Well Number (As shown on the application or plans):	MW-10
Well Completion Date:	12/4/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	2.17
Total Depth of Well (one-tenth of a foot):	21.8
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	9.0
Screen Length (feet):	15.0
Screen or Slot Size:	0.01
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	8.77
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910167

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 7 2 6 3 - _
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 16.43
Owners Well Number (As shown on the application or plans): MW-10

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

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932910168

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-964-6831): This number must be permanently affixed to the well casing.	2 6 - 7 2 8 7 - 4
Owner's Well Number (As shown on the application or plans):	MW-11
Well Completion Date:	11/30/84
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	-0.50 (flushmount)
Total Depth of Well (one-tenth of a foot):	17.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	1.5
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	0.98
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 6 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910169

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 7 2 8 7 - 4
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 6.78
Owners Well Number (As shown on the application or plans): MW-11

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910170

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-964-6831): This number must be permanently affixed to the well casing.	26-35223-4
Owner's Well Number (As shown on the application or plans):	MW-12
Well Completion Date:	
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	0.00 (Flushmount)
Total Depth of Well (one-tenth of a foot):	17.5'
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	2.5
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	0.84
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 7 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910171

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): This number must be permanently affixed to the well casing. 24-85228-4

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 5.84
Owners Well Number (As shown on the application or plans): MW-12

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910172

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	24-95201-3
Owner's Well Number (As shown on the application or plans):	MW-13
Well Completion Date:	
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	0.00 (Flushmount)
Total Depth of Well (one-tenth of a foot):	17.5'
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	2.5
Screen Length (feet):	15.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	1.34
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 7 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910173

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: _____

Location: _____

_____

NJPDES Number: NJ _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): This number must be permanently affixed to the well casing. 26-8521-4

Longitude (one-tenth of a second): West _____

Latitude (one-tenth of a second): North _____

Elevation of Top of Casing (cap off) (one-hundredth of a foot): 6.35

Owners Well Number (As shown on the application or plans): MW-13

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

_____

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

_____ SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

_____

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910174

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 1 3 1 3 2 - 3
Owner's Well Number (As shown on the application or plans):	MW-14
Well Completion Date:	5/26/88
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot);	0.00 (flushmount)
Total Depth of Well (one-tenth of a foot):	12.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	2.0
Screen Length (feet):	10.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	2.38
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 4 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910175

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 1 3 1 3 2 - 3
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 5.82
Owners Well Number (As shown on the application or plans): MW-14

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

SEAL

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

PROFESSIONAL LAND SURVEYOR'S LICENSE #

932910176

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER
MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION
(One form must be completed for each well)

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Permit No: NJ

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	2 6 - 1 3 1 3 3 - 1
Owner's Well Number (As shown on the application or plans):	MW-15
Well Completion Date:	5/25/88
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	0.00 (flushmount)
Total Depth of Well (one-tenth of a foot):	17.0
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	3.0
Screen Length (feet):	14.0
Screen or Slot Size:	0.01"
Screen Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter(Inches):	4"
Static Water Level From Top of Casing at The Time of Certification(one-hundredth of a foot):	8.88
Yield (Gallons per Minute):	5
Length of time Well Pumped or Bailed:	0 Hours 5 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information including the possibility of fine and imprisonment.

Professional Engineer's Signature

Dana Boyadjian
Professional Engineer's Name
(Please type or print)

SEAL

29363
Professional Engineer's License #

932910177

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Texaco, Inc.
Name of Facility: Former Getty Marketing and Refining Co.
Location: Newark, NJ

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 2 6 - 1 3 1 3 3 - 1
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West
Latitude (one-tenth of a second): North
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 16.44
Owners Well Number (As shown on the application or plans): MW-15

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

932910178